JUL 28 1924

Vol. VIII JUNE, 1924 No. 2

The Journal of APPLIED PSYCHOLOGY

EDITORS

JAMES P. PORTER
Ohio University

WILLIAM F. BOOK
Indiana University

WITH A

BOARD OF CO-OPERATING EDITORS

TABLE OF CONTENTS

ANDREW THOMAS WEAVER. Experimental Studies in Vocal Expression 159

A. T. POFFENBERGER AND B. E. BARROWS. The Feeling Value of Lines 187

WILLIAM R. WILSON, GERTRUDE WELSH AND HAROLD GULLIKSEN. An Evaluation of Some Information Questions 208

GLEN U. CLEETON AND F. B. KNIGHT. Validity of Character Judgments Based on External Criteria 215

RICHARD B. FRANKEN. Advertising Appeals Selected by the Method of Direct Impression 232

KATHRYN McHALE. An Experimental Study of the Vocational Interests of a Liberal Arts College Group 245

NOTES AND NEWS 256

BOOK REVIEWS 261

PUBLISHED BY THE EDITORS
WILLIAMS & WILKINS CO.
Mount Royal and Guilford Avenues
Baltimore, Md.

Entered as second class matter June 8, 1924, at the post office at Baltimore, Maryland, under the act of March 3, 1879.

Acceptance for mailing at special rate of postage provided for in section 1103, act of October 3, 1917, authorized December 21, 1922.

COPYRIGHT 1924, BY THE EDITORS

The Journal of Applied Psychology

CO-OPERATING EDITORS

W. V. Bingham, Carnegie Institute of Technology; John E. Downey, University of Wyoming; Roswell H. Gault, Northwestern University; William Healy, Baker Foundation, Juvenile Court, Boston; H. L. Hollingworth, Columbia University; Joseph Jastrow, University of Wisconsin; Herbert S. Langfeld, Harvard University; James H. Leuba, Bryn Mawr College, Henry C. McComas, Princeton University; Walter D. Scott, Northwestern University; C. E. Seashore, University of Iowa; Daniel Starch, Harvard Graduate School of Business Administration; Edward K. Strong, Jr., Carnegie Institute of Technology; L. M. Terman, Leland Stanford Jr. University; E. L. Thorndike, Columbia University; J. E. Wallace Wallin, Teachers College, Miami University; G. M. Whipple, University of Michigan; Helga Thompson Woolley, Vocation Bureau, Cincinnati.

The scope of The Journal of Applied Psychology will include the following: (a) The application of psychology to vocational activities, such as law, art, public speaking, industrial and commercial work, and problems of business appeal. (b) Studies of individual mentalities, such as types of character, special talents, genius, and individual differences, including the problems of mental diagnosis and vocational prognosis. (c) The influences of general environment conditions, such as climate, weather, humidity, temperature; also such conditions as nutrition, fatigue, etc. (d) The psychology of everyday activities, such as reading, writing, speaking, singing, playing games or musical instruments, sports, etc.

Communications, manuscripts, reviews, monographs, address, books and exchanges for review should be addressed to Dr. James P. Porter, Ohio University, Athens, Ohio. Contributors are requested to follow the conventional method of citation employed by this Journal; in every case the year, volume and pages should be specified.

The Journal of Applied Psychology is published quarterly. The subscription price is $4.00 a year. Single numbers $1.25. Remittances and business communications should be addressed to the Editors, James P. Porter, Ohio University, Athens, Ohio, or to William F. Book, Indiana University, Bloomington, Indiana.

EXPERIMENTAL STUDIES IN VOCAL EXPRESSION[1]

ANDREW THOMAS WEAVER

University of Wisconsin

II. THE PREDICTION OF TALENT FOR VOCAL EXPRESSION IN READING

The extension of the principles and technique of vocational psychology into the field of vocal expression is a new venture. Indeed, the use of psychological tests for determining artistic capacity and aptitude in any line is a most recent phase of the movement for vocational guidance. Seashore, in his tests of musical talent, blazed the trail. The objective in the experimentation herewith set forth was the assembling and weighting of a battery of tests which would give a significant coefficient of correlation with a criterion adequately representative of capacity for vocal expression in reading.

Preliminary analysis of the problem

One fundamental consideration to be borne in mind constantly is that vocal expression can be measured by only one standard: viz., *its effect upon listeners.* Vocal expression is something to be perceived, something to be reacted to, and if we would appraise it, we must do so by measuring the reactions of listeners. In the field of aesthetics, "there is nothing good or bad but thinking makes it so." Woolbert[2] proceeded upon this fundamental assumption. By implication at least, he says that one measure of vocal effectiveness is the permanence of its impression upon the listener. In the present study it has been taken for granted that vocal expression which is adjudged

[1] Continued from the March number.

[2] C. H. Woolbert, Effects of various modes of public reading. Journal of Applied Psychology, June–September, 1920.

to be good, bad, or indifferent by a representative group of listeners *is* what it is adjudged to be.

There is need for a much more comprehensive experimental study than has yet been made of the reactions of listeners to different types of vocal expression. Of course it may be asserted that the degree of skill indicated in a given bit of vocal expression is to be determined by measuring the proficiency shown in the use of each of the four elements of vocal sound; viz., force, quality, time, and pitch, but this is merely to restate the problem by breaking it into four pieces. Gordon and Lyman say: "In vocal expression, thought must seek an outlet through voice which thus becomes an object of study. . . . . It follows then that in the elementary qualities and attributes of sound a basis may be found for the study of vocal expression." And again, "These natural ways of uttering thought or emotion through the voice are of four kinds: melodic, qualitative, temporal, quantitative."[2] This represents the traditional answer to the question: what is vocal expression?—traditional, at least since Dr. James Rush wrote his *Philosophy of the Human Voice*, now nearly a century ago.

That there is help in this analysis of vocal expression into its physical elements, no one will deny. Its limitation is that it usually fails to distinguish between the physical elements of sound and their psychological correlates. The reactions of the listener to each of these elements, and more particularly to the fusion of them—a fusion made up always of four variables—are but slightly understood.

We now come to the question: what are the factors involved in the production and control of the complex activity comprehended under the term *vocal expression*? Or, more simply stated, what, so far as vocal expression is concerned, makes an effective reader?

The reply of most writers on vocal expression would be substantially as follows: Skill or ability in vocal expression depends upon an adequate, present understanding and appre-

[2] H. Gordon and R. L. Lyman, Vocal Expression in Speech. Ginn and Co., 1911, p. 18.

ciation of the meaning of the language uttered—both as to ideas and feelings, thoughts, and emotions; trained vocal organs capable of revealing this understanding and appreciation to the listener; and a proper conception of the reader's relation to the listener. This statement may be true but it is inadequate and somewhat superficial.

Scripture analyzes vocal control into the following factors:

1. Reflex tonus
2. Force of movement
3. Accuracy of movement
4. Precision of movement
5. Accuracy of coördination
6. Quickness of response
7. Quickness of movement
8. Forms of sensory-motor control
9. Ideo-motor control
10. General voluntary control[4]

One can scarcely read this list without noting some of its obvious defects. Despite Scripture's rather labored attempts to differentiate these ten factors, it remains dubious whether 3, 4, and 5; also 6 and 7 are not essentially identical. However, the analysis is fundamental and, when understood, it proves highly suggestive.

Before giving a tentative analysis of vocal expression, it may perhaps be well to quote Seashore as to the principles and considerations which guided him in a similar undertaking. He says,

> In making an inventory of the musical mind, we are guided by two coördinate bases of classification: first, the attributes of sound; and second, the generally recognized powers of the human mind. . . . . Our classification of items will, therefore, be a list of those traits of the human mind which are necessary for the apprehension and expression of the recognized attributes of sound. These are: the hearing of tones, the production of tones, the representation of tones in memory and imagination, musical thought, and musical feeling.[5]

---

[4] E. W. Scripture, Elements of experimental phonetics. Yale University Press, 1902, p. 382.

[5] C. E. Seashore, The psychology of musical talent. Silver, Burdett, and Co., 1919, pp. 6 and 7.

It should be remembered that we have restricted the meaning of the term *vocal expression* to *vocal expression in interpretative reading*, and that we are here engaged in the attempt to analyze the talent or capacity for such vocal expression. It seems to me that the following factors must be significant in this composite ability, talent, or capacity:

1. General intelligence
2. Emotional responsiveness
3. Neuro-muscular coördination
   - *a.* Motility
   - *b.* Accuracy
4. Audition
   - *a.* Sense of pitch
   - *b.* Sense of force
   - *c.* Sense of time
   - *d.* Sense of consonance
   - *e.* Memory for tones
   - *f.* Sense of rhythm

It will be seen that, in respects which I have tried to make clear, I am indebted to both Scripture and Seashore for this analysis. It seems certain that any attempt to predict talent for vocal expression in interpretative reading will involve the use of tests which measure some or all of the factors suggested here.

The criterion

Nothing need be said here regarding the importance of the criterion in vocational and aptitude tests. It is patent that the worth of any test or battery of tests depends upon the character of the criterion with which they are correlated. Unless the criterion actually represents the ability or the aptitude, statistical computation is but vanity.

In order that those interested in this study may have complete evidence upon which to base a just opinion as to its validity, the criterion is described in considerable detail.

The subjects

The subjects were two hundred ten young men from ten different sections of the course in "The Elements of Public Speaking" at the University of Wisconsin. The young women in these sections were eliminated from the tests in order to avoid constant errors from sex differences. There were doubtless inequalities in speech training which could not be compensated for or avoided in the testing, but so far as school training in vocal expression was concerned there were no marked differences. Training in vocal expression is a less controllable variable than training in most other school subjects.

The material read interpretatively

Austin Dobson's poem, "Tu Quoque" which was used in the experiments described in the former paper[6] was read by each of the subjects. Two days prior to the reading, the experimenter gave each subject a mimeographed copy of this selection and asked that careful preparation be made for the vocal interpretation of the material.

Judging

As each subject read the assigned selection he was judged by every other student in his group. Thus, if there were 25 subjects in a given group, there were 24 judgments on each reading.

Each member of each group was given a ballot on which to record his judgment of the vocal expression of the several readers. At the top of each ballot were the following instructions:

You are to give each reader a percentage grade on *vocal expressiveness*. If two readers seem *absolutely* equal to you, give them identical percentages. Try, however, to apply the same standard of *vocal expressiveness* to all and to make as fine distinctions as possible, using

[6] Andrew Thomas Weaver, Experimental studies in vocal expression. Journal of Applied Psychology, March, 1924.

fractional percentages if necessary. After you have assigned percentage grades to all readers, excluding yourself, proceed to rank them from best to worst on the basis of the percentages.

The experimenter made sure in each case that the instructions were thoroughly understood.

All was now in readiness for the series of readings. As the experimenter called off the names of the individuals within the group, they were set down on the ballots and the readers proceeded to the rear of the room where a reading stand had been placed. The members of the group had been instructed not to turn their heads so as to see the reader during the reading. Thus the influence of the visible symbols of speech—facial expression, posture, movement, and gesture—was eliminated from the judgment. Some visual memory images of the readers' previous appearances before the class may have been reinstated by the auditory stimulation, but there was no way of eliminating this possibility in a group more or less acquainted with each other. In any event, if this factor influenced the result, it must have operated to attenuate the correlation between the criterion and the tests rather than to increase it.

Compounding the judgments

When all of the ballots had been properly marked they were collected and the ranks were combined into a composite group-ranking. The ranks assigned to each reader were added together and the readers were re-ranked on the basis of the sums thus obtained; the first rank being given to the reader with the smallest total of ranks; second, to the next larger, and so on down to the lowest rank. Rank 25 in a group of that number was of course assigned to the reader with the highest total of ranks.

There were several reasons for combining the ranks instead of the percentages; the principal one being the disparity of the scales used by the different judges. It was felt that individual judges handle percentage grades so differently that there would be greater definiteness of meaning, and more of common value,

in ranks than in percentages. Then too, it seemed difficult if not impossible to get a sufficient spread in the percentage grades. Most students, like most teachers, always think of percentages in terms of school grades. They tend to fix the lower limit at 70 or 75 and the upper at 93 or 100. Perhaps if Professor West's studies in Judging[7] had been available when these experiments were under way, a satisfactory use of percentages might have been possible. It may well be added that the use of percentages involves perplexing questions when we attempt to combine different smaller groups into one large group as was necessary in this case.

The conversion of ranks into linear values

As explained in the preceding section, it was essential that some method of combining the smaller groups of subjects into one large group be found, if coefficients of correlation were to have any high degree of reliability. Since the groups were of unequal size, this problem seemed well nigh insoluble. Given unselected groups of unequal size, how was it to be determined just what the different *ranks* meant on a *common scale?*

Moreover, so long as our data is in terms of ranks we are restricted to the use of such coefficients of correlation as may be computed from ranked data: viz., Spearman's and its derivatives. There has been a good deal of question among statisticians as to the value of Spearman's coefficients and a growing insistence upon the use of a formula which takes into account the amount of differences in scores or grades as well as the order of ranks; viz., Pearson's products-moment method.

Moreover, it is held to be improper to use Spearman's coefficients in the regression equations which have been developed for weighting tests. Therefore since the criterion is so frequently a series of ranks, some method had to be worked out for converting ranks into measures available for use in Pearson's formula. Hull has made possible the solution of

[7] R. W. West, Methods of computing contest scores. Quarterly Journal of Speech Education, October, 1919, pp. 319 to 333.

both problems confronting us at this point; viz., the combining of the several groups of subjects into one large group and the computation of Pearson's coefficients of correlation from ranked data.[8] These things are accomplished by a formula for converting ranks into linear values on a common scale. Hull says:

"In translating the ranks into linear units, it is assumed that the ability in question is distributed according to the law of probability. . . . . Of course this is only approximately correct, but it is exact enough for practical purposes." The formula is:

$$\text{Per cent} = \frac{100\ (c - 0.5)}{n}$$

where c = the ranks of a subject and n = the number of subjects in the group. "The per cent value is roughly a percentage expression of the distance in rank of a given subject from the extreme of the distribution ranked as no. 1." In this experiment, a 100 point scale was used. The ranks within each group were converted into these common linear values and then the groups were all put together assigning to each subject his score on the common 100 point scale. Hull gives a convenient table for the conversion of ranks into linear values.

The reliability of the criterion

As already stated, no argument is needed to prove that the validity and reliability of the measures constituting the criterion are of basic importance in the attempt to set up tests of any aptitude, skill, or capacity. Have we described a criterion which is essentially valid and reliable?

No ready and simple answer can be made to this vital query. I take it that no incontrovertible evidence can be adduced to establish the reliability of any criterion which is constituted out of the opinions and judgments of human beings when there is no objective reality with which the judgment can be compared. If we have a series of weights varying from one to another by a

[8] C. L. Hull, The computation of Pearson's r from ranked data. Journal of Applied Psychology, December, 1922.

just perceptible increment we can tell how reliable the judgment of a given subject or group of subjects is by a comparison of the judgment with the objective reality—the series of weights. But obviously there is no such simple way of determining how accurately an individual or a group of individuals judge ability in vocal expression. Here we are dealing with an intangible quantity of a different order. Vocal expression is an aesthetic matter. It involves, if indeed it does not subsist in, the hearer's reaction and consequently excellence in it may be said to exist only in the hearer's opinion.

Therefore, it would seem that the only possible test of our criterion must be: *does it accurately represent the opinion of hearers in general?* If it does, who shall gainsay its validity? The one available way of determining the quality of the composite judgment which is to represent talent for vocal expression is then the testing of this composite as to its consistency within itself.

The extent of agreement between the composite judgment of one-half of the group and the composite judgment of the other half, furnishes some basis for an opinion as to the degree of probability of agreement between the judgment of this whole group and that of another whole group. Accordingly group judgments were split in two. To illustrate: if there were 24 judges, the procedure was as follows:

1. The group of judges was divided into two groups of 12 each.
2. The ranks assigned to each subject by the twelve judges in each of the two sub-groups were added.
3. The subjects were re-ranked on each sub-group's total of ranks.
4. The ranks representing the two judgments on each subject were converted into linear values.
5. The coefficient of correlation between the two composites representing the two sub-group's judgments was computed. (Pearson's products-moments formula).

This computation was made for five representative groups with results as shown in the following table.

GROUP	NUMBER IN GROUP	r BETWEEN TWO SUB-GROUPS
1	24	+0.922
2	26	+0.912
3	26	+0.918
4	26	+0.932
5	26	+0.962

Does it not seem a warrantable assumption that, if the judgment of the smaller sub-groups agree to this extent, the judgment of another whole group on the data in question would agree even more closely with the judgment of this whole group?[9] And if so, have we not a reasonably reliable measure of vocal expression?

Some one may raise a question as to the expertness of the judges. It may possibly be urged that the criterion should be made up from the judgments of those competent to express an expert opinion as to what constitutes effective vocal expression. In answering this objection, we may well inquire as to whether an opinion which fails to conform to the judgment of a group of intelligent people can be accepted as expert and, if so, in what sense. I think that we may safely conclude that our criterion expresses with a reasonable degree of accuracy the typical judgment of intelligent persons as to what *vocal expression* in reading means.

The tests

In choosing the tests to be tried out in the attempt to build up a battery which should show significant correlations with our criterion, several general considerations had to be kept in mind. First, it was felt to be impracticable to use individual tests. It would have been impossible in any reasonable amount of time to test a number of subjects large enough to give any high degree of reliability to the correlations which might appear Then too, the usefulness of any battery of vocational or apti-

[9] K. Gordon, A study of aesthetic judgments. Journal of Experimental Psychology, February, 1923.

tude tests is directly dependent upon their availability for group use.

The second principle which guided in the choice of tests was that of simplicity of technique in giving and scoring them. If tests are to be of any general usefulness they must be easy to give and easy to score, and they must have some range of adaptability with respect to the size of the groups which can be tested.

Finally, tests which seemed to offer the possibility of duplicating each other were avoided. The aim, as in all similar cases, was to assemble a battery of tests which should yield the highest possible correlations with the criterion and, at the same time, the lowest possible inter-correlations among themselves.

It was obviously impracticable to attempt tests of all the factors noted in our tentative analysis of vocal expression. Leaving out the second and third categories, *General Intelligence* and *Audition* remain and these were the peculiar objectives in the selection and use of the various tests which were tried out and from which the battery was finally assembled.

Two tests of general intelligence were essayed; viz., Army Alpha and Terman's revision of the Binet-Simon word list. After some preliminary experimentation, the former was abandoned in favor of the latter. Computations showed that the army test was not more closely related to the criterion and that it was substantially duplicated in the simpler vocabulary test. It was not difficult to foresee the negligible advantage which would result from the combination of these two tests between which the coefficient of correlation is in the neighborhood of +0.60.

For measuring the various phases of *audition* the most promising available tests were Seashore's group measures of musical talent. The phonograph records, (A7536, A7537, A7538, A7539, and A7540) issued by the Educational Department of the Columbia Graphophone Company make possible group measurements of *sense of pitch, sense of intensity, sense of time, sense of consonance*, and *tonal memory*.

Thus the tentative battery of tests was narrowed down to the vocabulary test and the five Seashore phonograph tests. All of these tests can be given expeditiously and effectively to groups of any size by any experimenter whether he is particularly skilled in the technique of psychological testing or not.

The instructions given in connection with the vocabulary test were as follows:

> You are to indicate your knowledge of the meaning of each word on the list by filling in the blank space after the word in one of three ways: with a definition of the word; with a synonym; or with a sentence, clause, or phrase in which the word is correctly and unambiguously used. If, from what you write, it is not reasonably certain that you know the meaning of a word, it will be marked wrong.

TABLE 1

	LOWEST	HIGHEST	MEAN	σ
Sense of pitch	40	93	76.53	10.91
Sense of intensity	61	99	89.18	5.74
Sense of time	53	93	79.14	6.22
Sense of consonance	44	90	69.17	4.43
Tonal memory	12	100	70.06	17.18
Vocabulary	42	96	75.07	9.73
Criterion	11	89	50.00	18.77

The subjects were given as much time as necessary to fill in the whole list. This usually required the greater part of one class period (fifty minutes). It was not thought necessary or helpful to check the time factor in the tests.

One examiner marked *all* of the vocabulary tests in order that there might be a minimum of variation in the standard of correctness applied. The score is the number of correct answers.

The Seashore tests were given in strict accordance with the directions in the manual of instructions furnished by the Columbia Company with the phonograph records. In the present experiment each of the five tests was given twice and the score assigned to each subject was the average of his two scores.

In table 1 are presented the lowest and highest scores, the means, and the standard deviations, in the five tests and the criterion.

Coefficients of correlation of the zero order

As in all similar cases, we must first compute all possible zero order coefficients of correlation between the criterion and the tests and among the tests themselves.

The formula used is an adaptation of the standard Pearson's products-moments formula:

$$r = \frac{M_{AB} - (M_A \times M_B)}{\sqrt{M_{A^2} - M_A^2}\,\sqrt{M_{B^2} - M_B^2}}$$

This formula yields values absolutely identical with those obtained by the use of the standard formula and it has obvious practical advantages. It may be observed that the two radicals are respectively the equivalents of the two standard deviations.

The following table shows the complete list of zero order coefficients.

	SENSE OF PITCH	SENSE OF INTENSITY	SENSE OF TIME	SENSE OF CONSONANCE	TONAL MEMORY	VOCABULARY
Vocal expression..	+0.4847	+0.1817	+0.1940	+0.3170	+0.3498	+0.2742
Sense of pitch.....		+0.3179	+0.3029	+0.7780	+0.5224	+0.2462
Sense of intensity			+0.2257	+0.2412	+0.2018	−0.0082
Sense of time.....				+0.4781	+0.2790	+0.0782
Sense of consonance.....					+0.7530	+0.3533
Tonal memory....						+0.2754

A casual inspection of the above data at once raises the question as to whether it is worth while to attempt a combination of *all* of the tests in the proposed battery. The most dubious candidate for inclusion seems to be the *sense of consonance test.* The correlations of this test with the others are so high, particularly with *sense of pitch* and *tonal memory,* that it is extremely doubtful whether it would add anything to the predictive value of the combination. Some preliminary computations showed clearly that it would not, and consequently it was dropped from consideration.

After the elimination of the sense of consonance test the six remaining variables are:

1. Criterion (vocal expression)
2. Sense of pitch
3. Sense of intensity
4. Sense of time
5. Tonal memory
6. Vocabulary

The zero order coefficients of correlation are:

$r_{12} = +0.4847$

$r_{13} = +0.1817$	$r_{23} = +0.3179$			
$r_{14} = +0.1940$	$r_{24} = +0.3029$	$r_{34} = +0.2257$		
$r_{15} = +0.3498$	$r_{25} = +0.5524$	$r_{35} = +0.2018$	$r_{45} = +0.2790$	
$r_{16} = +0.2742$	$r_{26} = +0.2462$	$r_{36} = -0.0082$	$r_{46} = +0.0728$	$r_{56} = +0.2754$

Coefficients of multiple and partial correlations

It was thought to be advisable to compute the coefficients of multiple correlation, (R), for variables 1–5 inclusive and for variables 1–6 inclusive, and to work out regression equations and prediction formulae for each of the two groups of variables. A complete list of the partial coefficients needed for these computations is herewith presented.

Partial correlation coefficients of the first order

$r_{13.2} = +0.0332$	$r_{45.2} = +0.1482$	$r_{23.5} = +0.2539$
$r_{14.2} = +0.0565$	$r_{46.2} = -0.0019$	$r_{24.5} = +0.1917$
$r_{15.2} = +0.1293$	$r_{56.2} = +0.1772$	$r_{25.6} = +0.1245$
$r_{16.2} = +0.1827$	$r_{12.5} = +0.3774$	$r_{34.5} = +0.1800$
$r_{24.2} = +0.1429$	$r_{13.5} = +0.1210$	$r_{36.5} = -0.0677$
$r_{35.2} = +0.0440$	$r_{14.5} = +0.1072$	$r_{46.5} = -0.0043$
$r_{36.2} = -0.0941$	$r_{16.5} = +0.1975$	$r_{15.6} = +0.2966$

Partial correlation coefficients of the second order

$r_{14.23} = +0.0523$	$r_{12.45} = +0.3654$	$r_{12.35} = +0.3611$
$r_{15.23} = +0.1280$	$r_{13.45} = +0.1039$	$r_{16.35} = +0.1910$
$r_{16.23} = +0.1867$	$r_{16.45} = +0.1990$	$r_{24.35} = +0.1534$
$r_{45.23} = +0.1434$	$r_{23.45} = +0.2271$	$r_{26.35} = +0.1468$
$r_{46.23} = +0.0116$	$r_{26.45} = +0.1276$	$r_{46.35} = +0.0079$
$r_{56.23} = +0.1823$	$r_{36.45} = -0.0680$	$r_{14.56} = +0.1101$

Partial correlation coefficients of the third order

$r_{14.235} = +0.0345$ $r_{15.234} = +0.1219$ $r_{25.345} = +0.1470$
$r_{16.235} = +0.1494$ $r_{16.234} = +0.1863$ $r_{12.456} = +0.3499$
$r_{46.235} = -0.0149$ $r_{56.234} = +0.1825$ $r_{13.456} = +0.1200$
$r_{13.245} = +0.0230$ $r_{13.345} = +0.3527$ $r_{23.456} = +0.2383$
$r_{16.345} = +0.2076$

Partial correlation coefficients of the fourth order

$r_{12.3456} = +0.3333$ $r_{14.2356} = +0.0326$ $r_{46.1235} = -0.0203$
$r_{13.2456} = +0.0402$ $r_{15.2346} = +0.0909$ $r_{56.1234} = +0.1637$
$r_{16.2345} = +0.1684$

There are always two ways of writing the formula for the coefficient of multiple correlation.[10] For five variables these are:

$$(1)\ R_{1(2345)} = \sqrt{1 - (1 - r_{12}^2)(1 - r_{13.2}^2)(1 - r_{14.23}^2)(1 - r_{15.234}^2)}$$

$$(2)\ R_{1(2345)} = \sqrt{1 - (1 - r_{15}^2)(1 - r_{15.4}^2)(1 - r_{15.34}^2)(1 - r_{12.345}^2)}$$

In the present instance the two formulae yield:

$$(1)\ R = +0.4969$$
$$(2)\ R = +0.4920$$

respectively. The slight discrepancy is doubtless due to dropping off decimals. Thus it may be foreseen that the four tests when given optimum weights and combined will yield a coefficient of correlation with the criterion about 0.01 higher than does the first test singly.

The two writings of the multiple correlation formula for six variables are:

$$(1)\ R_{1(23456)} = \sqrt{1 - (1 - r_{16}^2)(1 - r_{16.5}^2)(1 - r_{16.45}^2)(1 - r_{16.345}^2)(1 - r_{12.3456}^2)}$$

$$(2)\ R_{1(23456)} = \sqrt{1 - (1 - r_{12}^2)(1 - r_{13.2}^2)(1 - r_{14.23}^2)(1 - r_{15.234}^2)(1 - r_{16.2345}^2)}$$

[10] G. U. Yule, Introduction to the theory of statistics. Charles Griffin and Co., 1919, pp. 248 and 249.

Curt Rosanow, The analysis of mental functions. Psychological Review Monograph Supplements, Vol. XXIV, No. 5, pp. 17 to 20.

These yield respectively:

$$(1)\ R = +0.5200$$
$$(2)\ R = +0.5203$$

indicating that the addition of the vocabulary test raises the predictive value of the battery approximately 0.025. The gain over the correlation between the criterion and the first test is disappointingly slight. It shows that when the correlation between one test and a criterion is very high, it is impossible to raise the correlation substantially if additional tests have any considerable tendency to correlate with the first test.[11]

Partial standard deviations

In preparing for the solving of the regression equations for the two sets of variables, we next proceed to compute the necessary partial standard deviations. The standard deviations for the six variables may be found in table 1.

Rosanow gives formulae for five partial standard deviations.[12] Those for six partial standard deviations written by analogy from Rosanow's formulae are:

$$\sigma_{1.23456} = \sigma_1 \sqrt{1 - r^2_{12}} \sqrt{1 - r^2_{13.2}} \sqrt{1 - r^2_{14.23}} \sqrt{1 - r^2_{15.234}} \sqrt{1 - r^2_{16.2345}}$$

$$\sigma_{2.13456} = \sigma_2 \sqrt{1 - r^2_{21}} \sqrt{1 - r^2_{24.1}} \sqrt{1 - r^2_{25.146}} \sqrt{1 - r^2_{26.1456}} \sqrt{1 - r^2_{12.3456}}$$

$$\sigma_{3.12456} = \sigma_3 \sqrt{1 - r^2_{31}} \sqrt{1 - r^2_{34.1}} \sqrt{1 - r^2_{35.146}} \sqrt{1 - r^2_{36.1456}} \sqrt{1 - r^2_{13.3456}}$$

$$\sigma_{4.12356} = \sigma_4 \sqrt{1 - r^2_{41}} \sqrt{1 - r^2_{24.1}} \sqrt{1 - r^2_{34.12}} \sqrt{1 - r^2_{45.123}} \sqrt{1 - r^2_{46.1235}}$$

$$\sigma_{5.12346} = \sigma_5 \sqrt{1 - r^2_{51}} \sqrt{1 - r^2_{52.1}} \sqrt{1 - r^2_{53.12}} \sqrt{1 - r^2_{54.123}} \sqrt{1 - r^2_{56.1234}}$$

$$\sigma_{6.12345} = \sigma_6 \sqrt{1 - r^2_{61}} \sqrt{1 - r^2_{62.1}} \sqrt{1 - r^2_{63.12}} \sqrt{1 - r^2_{64.123}} \sqrt{1 - r^2_{65.1234}}$$

The formulae for the partial standard deviations yield the following values for the five variables:

[11] C. L. Hull, The joint yield from teams of tests. Journal of Educational Psychology, October, 1923, pp. 396 to 406.

[12] Curt Rosanow, op. cit., pp. 39 to 45.

$$\sigma_{1.2345} = 16.2660$$
$$\sigma_{2.1345} = 8.3352$$
$$\sigma_{3.1245} = 5.3887$$
$$\sigma_{4.1235} = 5.7995$$
$$\sigma_{5.1234} = 14.4003$$

and the following values for the six variables:

$$\sigma_{1.23456} = 16.0258$$
$$\sigma_{2.13456} = 8.3047$$
$$\sigma_{3.12456} = 5.3531$$
$$\sigma_{4.12356} = 5.7983$$
$$\sigma_{5.12346} = 14.2027$$
$$\sigma_{6.12345} = 9.0878$$

Regression equation and prediction formula for criterion and four tests

We are now in possession of all the data needed for the solution of the two regression equations which have been our ultimate objectives. Let us first write and solve the equation for five variables. The formula follows:

$$x_1 = r_{12\cdot345}\frac{\sigma_{1\cdot2345}}{\sigma_{2\cdot1345}}x_2 + r_{13\cdot245}\frac{\sigma_{1\cdot2345}}{\sigma_{3\cdot1245}}x_3 + r_{14\cdot235}\frac{\sigma_{1\cdot2345}}{\sigma_{4\cdot1235}}x_4 + r_{15\cdot234}\frac{\sigma_{1\cdot2345}}{\sigma_{5\cdot1234}}x_5$$

When the proper values have been substituted in this formula, we have:

$$x_1 = 0.6883x_2 + 0.0694x_3 + 0.0967x_4 + 0.1377x_5$$

Before rewriting this equation in the form useful for work with the raw scores, (X) we may correct the weights in such a way as to restore the original distribution of the grades on the criterion. Theoretically our σ on the criterion should be 20. In the present case it was 18.77. This is the first factor for which we must compensate. More important than this, however, is the condensation of the prospective distribution which would result from the use of the weights just obtained for prediction purposes, due to the fact that the coefficient of multiple correlation, (R) is 0.4969 instead of 1.00. If we should attempt to use the weights just obtained to predict scores on

the criterion we should find ourselves unable to predict either any very good or very poor readers—our weights are too small to spread the predicted scores out toward the extremes as we find the actual scores spread.[13]

Therefore, we restore the original spread by multiplying each of the weights by a constant term obtained from the following formula:

$$c = \frac{\sigma'_1}{R_{\sigma_1}}$$

Where c = the constant term; σ'_1 the standard deviation desired in the predicted scores; σ_1 the actual standard deviation of the original criterion scores; and R the coefficient of multiple correlation. Substituting we have:

$$c = \frac{20}{0.4969 \times 18.77} = 2.1443$$

Multiplying the weights in our regression equation by this constant value, we convert our regression equation into a prediction formula:

$$x_1 = 1.4759x_2 + 0.1488x_3 + 0.2075x_4 + 0.2953x_5$$

Substituting the means of the variables and combining numerical values we arrive at the form of our prediction formula which is available for immediate use with the raw scores on the tests:

$$X_1 = 1.4759X_2 + 0.1488X_3 + 0.2075X_4 + 0.2953X_5 - 113.3278$$

Regression equation and prediction formula for criterion and five tests

The working formula for six variables is:

$$x_1 = r_{12\cdot3456}\frac{\sigma_{1\cdot23456}}{\sigma_{2\cdot13456}}x_2 + r_{13\cdot2456}\frac{\sigma_{1\cdot23456}}{\sigma_{3\cdot12456}}x_3 + r_{14\cdot2356}\frac{\sigma_{1\cdot23456}}{\sigma_{4\cdot12356}}x_4 + r_{15\cdot2346}\frac{\sigma_{1\cdot23456}}{\sigma_{5\cdot12346}}$$

$$\cdot\ x_5 + r_{16\cdot2345}\frac{\sigma_{1\cdot23456}}{\sigma_{6\cdot12345}}x_6$$

[13] C. L. Hull, Prediction formulae for teams of aptitude tests. Journal of Applied Psychology, September, 1923, pp. 277 to 284.

Substituting the proper values we have:

$$x_1 = 0.6333x_2 + 0.1204x_3 + 0.0901x_4 + 0.1026x_5 + 0.2970x_6$$

The constant term by which these weights must be multiplied to convert the regression equation into a prediction formula, as before explained, is:

$$\frac{20}{0.52 \times 18.77} = 2.049$$

The correct weights are then:

$$x_1 = 1.2976x_2 + 0.2467x_3 + 0.1846x_4 + 0.2102x_5 + 0.6084x_6$$

Substituting $(X-M)$ for (x) and combining the non-literal values as in the preceding case we have our prediction formula for the five tests:

$$X_1 = 1.2976X_2 + 0.2467X_3 + 0.1846X_4 + 0.2102X_5 + 0.6086X_6 - 146.3294$$

Now if these weights are correct we should be able to go back over the scores of the 210 subjects on the five tests and predict scores on the criterion which will correlate with the actual scores to the extent of our R which for the criterion and the five tests was $+0.5200$ In order to facilitate these calculations, a table was prepared showing all possible products of the respective weights by the scores made in each test.

The coefficient of correlation between the predicted scores and the actual scores, as computed by means of our adapted products-moment formula, is $+0.5098$ which is a little short of the true figure. This may be the result of slight errors in calculation, or it may be due simply to the dropping of decimals; all decimals were dropped from the predicted scores. The mean of the predicted scores is 49.98 as compared with 50 for the actual scores, a very close approximation. The σ for the predicted scores is 19.82 as against 20 for the actual scores.

TABLE 2

Products of test scores by prediction formula weights

SCORE	SENSE OF PITCH X_2	SENSE OF INTENSITY X_3	SENSE OF TIME X_4	TONAL MEMORY X_5	VOCABULARY X_6
10				2.102	
11				2.312	
12				2.522	
13				2.733	
14				2.943	
15				3.153	
16				3.363	
17				3.573	
18				3.784	
19				3.994	
20				4.204	
21				4.414	
22				4.624	
23				4.835	
24				5.045	
25				5.255	
26				5.465	
27				5.675	
28				5.886	
29				6.096	
30				6.306	
31				6.516	
32				6.726	
33				6.937	
34				7.147	
35				7.357	
36				7.567	
37				7.777	
38				7.988	
39				8.198	
40	51.880			8.408	24.344
41	53.177			8.618	24.953
42	54.474			8.828	25.561
43	55.771			9.039	26.170
44	57.068			9.249	26.778

TABLE 2—*Continued*

SCORE	SENSE OF PITCH X_2	SENSE OF INTENSITY X_3	SENSE OF TIME X_4	TONAL MEMORY X_5	VOCABULARY X_6
45	58.365			9.459	27.387
46	59.662			9.669	27.996
47	60.959			9.879	28.604
48	62.256			10.090	29.213
49	63.553			10.300	29.821
50	64.850		9.230	10.510	30.430
51	66.147		9.415	10.720	31.039
52	67.444		9.599	10.930	31.647
53	68.741		9.784	11.141	32.256
54	70.038		9.968	11.351	32.864
55	71.335		10.153	11.561	33.473
56	72.632		10.338	11.711	34.082
57	73.929		10.522	11.981	34.690
58	75.226		10.707	12.192	35.299
59	76.523		10.891	12.402	35.907
60	77.820	14.802	11.076	12.612	36.516
61	79.117	15.049	11.261	12.822	37.125
62	80.414	15.295	11.445	13.032	37.733
63	81.711	15.542	11.630	13.243	38.342
64	83.008	15.789	11.814	13.453	38.950
65	84.305	16.035	11.999	13.663	39.559
66	85.602	16.282	12.184	13.873	40.168
67	86.899	16.529	12.368	14.083	40.776
68	88.196	16.776	12.553	14.294	41.385
69	89.493	17.022	12.737	14.504	41.993
70	90.790	17.269	12.922	14.714	42.602
71	92.087	17.516	13.107	14.924	43.211
72	93.384	17.762	13.291	15.134	43.819
73	94.681	18.009	13.476	15.345	44.428
74	95.978	18.256	13.660	15.555	45.036
75	97.275	18.502	13.845	15.765	45.645
76	98.572	18.479	14.030	15.975	46.254
77	99.869	18.996	14.214	16.185	46.862
78	101.166	19.243	14.399	16.396	47.471
79	102.463	19.489	14.583	16.606	48.079

TABLE 2—*Concluded*

SCORE	SENSE OF PITCH X_2	SENSE OF INTENSITY X_3	SENSE OF TIME X_4	TONAL MEMORY X_5	VOCABULARY X_6
80	103.760	19.736	14.768	16.816	48.688
81	105.057	19.983	14.953	17.026	49.297
82	106.354	20.229	15.137	17.336	49.905
83	107.651	20.476	15.322	17.447	50.514
84	108.948	20.723	15.506	17.657	51.122
85	110.245	20.969	15.691	17.867	51.731
86	111.542	21.216	15.876	18.077	52.340
87	112.839	21.463	16.060	18.287	52.948
88	114.136	21.710	16.245	18.498	53.557
89	115.433	21.956	16.430	18.708	54.165
90	116.730	22.203	16.614	18.918	54.774
91	118.027	22.450	16.799	19.128	55.383
92	119.324	22.696	16.983	19.338	55.991
93	120.621	22.943	17.168	19.549	56.600
94	121.918	23.190	17.352	19.759	57.208
95	123.215	23.436	17.537	19.969	57.817
96	124.512	23.683	17.722	20.179	58.426
97	125.809	23.930	17.906	20.389	59.034
98	127.106	24.177	18.091	20.600	59.643
99	128.403	24.423	18.275	20.810	60.251
100	129.700	24.670	18.460	21.020	60.860

Summary and conclusions

Of what practical value is a battery of aptitude tests correlating to the extent of +0.52 with a criterion? Those who have never attempted to assemble a group of prognostic tests may consider a coefficient of +0.52 too small to be worth much. It may be asserted that a relationship represented by a coefficient of this size means that the predictions issuing from the use of the tests will be wrong as frequently as they will be right. This attitude rests upon a failure to understand the essential nature of correlation.

There are doubtless present in our computation many factors which attenuate our coefficient. At least two such factors should be noted.

Inaccuracy of the measures

Although the final score on each test was the average of two trials, it was probably still some distance from an accurate measure of the subjects' true ability. One reason for this is the inevitable confusion between the physiological and the cognitive thresholds in the Seashore tests.[14] It was not unusual to find a subject who in one of his records on the pitch test, usually the first, distinguished between the two tones in some of the columns where the difference was relatively large but confused the higher with the lower. Such a subject evidently *knew* that the two pitches differed even though he was mistaken as to the direction of the difference. In other words, the record showed a poor *knowledge* of pitch rather than a poor *sense* of pitch.

If time permitted, all subjects should be given training enough to obviate such gross inaccuracies of measurement. There can be no question but that they cut down the coefficient of correlation. On this basis we are justified in maintaining that if the measures were accurate we should probably have a higher correlation.

As was stated in the preceding chapter, the formula for the conversion of ranks into linear units presupposes a symmetrical, bell-shaped distribution. Since, from a careful examination of the data, it is doubtful whether the distribution actually conforms strictly to this standard, the application of the formula probably introduces another factor of attenuation. The one comforting aspect of this situation is that the resulting correlations are *less* than the true correlations, and that our conclusions as to the relations between tests and criterion err on the side of modesty rather than over-statement.

Importance of the pitch factor

One fact which seems to emerge unambiguously from the mass of correlations, intercorrelations partial correlations, and

[14] C. E. Seashore, op. cit., p. 52.

multiple correlations is that the sense of pitch is of central importance in auditory experience and in vocal expression. Since the test of sense of pitch is correlated with our criterion to the extent of +0.4847, and since the addition of four other tests raises this figrre by less than 0.04, it becomes apparent that sense of pitch somehow is carrying most of the load.

Sense of pitch and intelligence

Seashore asserts that sense of pitch does not vary with sex and that it is not correlated with intelligence. It may have been observed that there was considerable correlation between the scores on sense of pitch and vocabulary. While +0.2462 is not high, it is approximately six times its probable error which is only 0.0431 and it therefore seems to be real. Seashore's conclusions on this point rests "upon evidence from various angles in many thousands of cases." The one case cited is vague, but it rests upon a correlation between teachers' estimates of pupils' school ability and their scores in sense of pitch tests. The statistical method used was a quintile table. Even here the results indicated a slight positive relationship which Seashore admits. He accounts for this by saying: "Some children are so backward mentally that they are not able to do credit to their actual psycho-physic capacity." It seems to me that, while this explanation may be correct, it would be altogether simpler to conclude that there *is* some correlation.

I gave the Army Alpha and the Seashore tests to 94 subjects. The coefficients of correlation (Spearman's Rank Method) between the scores on the Army tests and the scores on the Seashore tests were:

1. Army Alpha and sense of pitch = +0.35
2. Army Alpha and sense of intensity = +0.24
3. Army Alpha and sense of time = +0.12
4. Army Alpha and sense of consonance = +0.06
5. Army Alpha and tonal memory = +0.26

Implications for the teaching of vocal expression

What is there in the data brought forth by these studies that may be of practical significance for those whose major interest lies in teaching vocal expression? Have we discovered anything which is immediately and definitely utilitarian and, if so, what?

If we are justified in our tentative analysis of talent for vocal expression, then it behooves us to examine carefully the elements which we have been testing with a view to ascertaining which of them, if any, are susceptible of improvement through training. For example, if the sensitiveness of the ear to pitch differences is associated with skill in using the voice expressively, then we should consider the question of improving and using this capacity in the student of vocal expression.

Seashore, Smith, Buffum, and others agree that the sense of pitch cannot be improved by training. Such improvement in discrimination as arises from practice is held to be the result of bringing the cognitive threshold down toward the physiological threshold. In one statement Seashore rather confuses his stand by remarking: "The training in agreeableness of speech may furnish more refinement of the sense of pitch than instruction in the piano does." It may be wondered how anything can "refine" that which is incapable of modification through training. It would seem clear that, whatever the essential nature of the improvement, every effort should be made to develop the cognitive aspects of the sense of pitch as completely as possible; the ultimate aim being to make the cognitive and physiological limits of differential audition coincide. To this end, the use of the Seashore phonograph tests may be commended as furnishing a simple and available means for training in pitch discrimination.

In so far as the Terman-Binet-Simon word list is a bona fide test of general intelligence, it seems reasonable to conclude that as the capacity for the handling of concepts increases, vocal expression improves. Certain it is that the commonplace maxim of speech teaching, viz., that impression or intellectual assimilation must precede expression, finds support in these in-

vestigations. It is scarcely possible to place too much emphasis upon the necessity for understanding and appreciating the meanings of words which are to be uttered in interpretative reading.

Since each of these factors of vocal expression is important, individual differences in them among students become significant. By reference to the scores given in the preceding chapter, we may gain some appreciation of the spread of distribution in these auditory capacities. Seashore says:

> One person may hear a difference of $\frac{1}{4}$ d.v., less than $\frac{1}{200}$ of a tone, whereas another may not be able to hear any smaller difference than a half tone or even more; counting $\frac{1}{4}$ d.v. as the best and 50 d.v. as the poorest case observed, it appears that one may be at least two hundred times as keen as another in this capacity.

The scores made by my 210 subjects in all of the tests indicate differences of similar magnitude.

The tests may perform a valuable service for the teacher of vocal expression in suggesting the significant limitations and the special capacities among the students. If, for example, a teacher gives the students the pitch test and finds that a particular individual has a very bad ear for pitch difference, it would seem the part of wisdom not to expect such a student to make effective use of the pitch element in vocal expression. Probably the best procedure would be to train the subject to compensate for such deficiency by substituting variety in volume, time and quality for pitch changes.

Future studies

It should be clear from what has been said thus far that experimental studies of vocal expression and associated problems are but beginning. If after having gone through the process once, one could recommence such a series of studies as has been described, it would be possible to do many things more effectively. As an investigator works through one problem, new problems and suggested methods of attack loom on every hand. If the present studies help to map out some slight

portion of terra incognita and to suggest ways by which more may be surveyed, they will not have been wholly vain. To that end it may be worth while to indicate briefly what now appear to be the future studies most likely to bear valuable fruit.

Emotion and vocal expression

Vocal expression originates as emotional response and emotion is being looked to more and more for the explanation of many of the basic phenomena of voice. The work of Blanton and others has proceeded upon the thesis that abnormalities in vocal expression are directly traceable to stress, strain, and conflict in the emotional life. From time immemorial there has been a general agreement among teachers and students of vocal expression that the voice is conditioned and controlled by emotional states.

It is not difficult to see how this idea has acquired its popularity. What we need at this point is some more generally accepted definition of emotion and more accurate ways of getting objective measures of emotional states and phenomena, particularly of *emotional sensitivity* and *control*. We should seek to measure the sensitiveness to emotional stimuli first of all. But more important than this must be the *type* of emotional response. It would seem more than probable that unless a reader is responsive to emotional values and suggestions, he is bound to be cold and inexpressive vocally. And yet it is quite conceivable that he may be *too* sensitive or at least too uncontrolled in his response.

The plethysmograph, the pneumograph, the cardiograph, the psycho-galvanic reflex, the verbal report, blood tests, etc., suggest themselves as possible methods of approach. We need objective measures of emotional responses and these objective measures must be carefully studied with reference to the psychological states with which they are correlated. Then the capacity for vocal expression must be measured in some way and the relation between this criterion and the phenomena of emotional response carefully considered.

Neuro-muscular coördination and voice

Voice is produced by the same sort of mechanism as is manifested in walking, breathing, handwriting, etc., viz., by the contraction and relaxation of muscles. Numerous muscles must work together properly to make articulate vocalization possible. It then appears obvious that skill and effectiveness in the coördinated use of these muscles determines vocal expressiveness. Here is a rich and exceedingly promising field for investigation and, moreover, one which lends itself readily to experimental methods. Here are involved the following factors of voice control, according to Scripture's analysis already cited: reflex tonus, force of movement, accuracy of movement, precision of movement, accuracy of coördination, quickness of response, and general voluntary control. We are indebted to Scripture for suggestions as to how some of these various factors may be measured. He proposes that we study muscle tonus with a tonal dynamometer. He also explains methods of measuring force of movement in the respiratory muscles and in muscles of the lips and tongue.

Scripture holds that vocal control is dependent upon general voluntary control and that studies of arm and finger movement furnish results which are directly applicable to the problem of voice control. If we accept this point of view, we may go forward with some of the recognized methods for the study of reaction, time, speed of movement, accuracy of movement, etc. By applying the technique of correlation to our results we may be able to interpret them in terms of their relation to a criterion adequately representing vocal expression.

THE FEELING VALUE OF LINES

A. T. POFFENBERGER AND B. E. BARROWS
Psychological Laboratory, Columbia University

Among the factors that determine the affective value of any visual presentation (such as color, subject, balance, light and shade), line forms have occupied an important position in the opinions of writers on Aesthetics. Cox[1] says:

> Straight lines will always express rigidity and stiffness while curves will express some sort of growth or motion. The vertical line is a line of stability, of strength and vigor. . . . . All these characteristics of lines may be the result of association or they may have some deeper reason, but they are there, in the lines themselves, without regard to what the lines may be used to represent, and are the most valuable means to artistic expression.

According to Puffer[2]

> The moment we touch upon line form, we are already, in strictness, beyond the elements. For with form enters the motor factor, which cannot be separated from the motor innervations of the whole body.
>
> It is possible, however, to abstract for the moment, from the form as a unit, and to consider here only what may be called the quality of a line.
>
> A line may be straight or broken, and if curved, curved continuously or brokenly, etc. That this quality of a line is distinct from the form may be shown by the simple experiment of turning a spiral in different ways around its focus. The aesthetic effect of the figure is absolutely different in the different positions, and yet the feeling about the character of the line itself seems to remain the same.
>
> The very process of apprehending a line involves not only motor memories and impulses, but numberless ideal associations, and these associations constitute the line as truly as do the others. The impression of the line involves expression, a meaning which we cannot escape.

[1] Concerning painting, pp. 44ff.

[2] Ethel D. Puffer, Psychology of beauty, p. 102, 116.

Münsterberg[3] interprets the effects of lines as follows:

Every curve or line or space division is thus psychologically a system of eye movement sensations. The optical impression, as it is at present and for itself alone, may absorb our mind; then the motor impulse to the organism will discharge itself and lead to localized tensions and movement sensations.

The result must be that the feelings of strain and impulse that go on in ourselves are not projected into our body, but into the visual impressions; just as the optical sensations were all the time joining themselves with the movement sensations of the eye muscles, so in this case optical sensations and eye muscle sensations are fusing with sensations of bodily tension, and while the muscle sensations of the eyes give the local values and distance relations to the light impressions and thus build up ideas of geometrical forms, these sensations of impulse and strain give to the optical form an element of force and energy.

We are contracting our muscles, but we feel as if the lines were pulling and piercing, bending and lifting, pressing down and pushing up; in short, as soon as the visual impression is really isolated and all other ideas really excluded, then the motor impulses do not awake actions which are actions of ourselves, but feelings of energy which are taken as energies of the visual forms and lines.

Hollingworth,[4] in discussing the feeling tone of advertisements, says:

This feeling tone of lines can be used to advantage in representing advertised articles both by relevant and irrelevant cuts, and should also be considered in the appropriate selection of type faces. The feeling tone of a line depends upon three chief factors; its quality; its direction; and its character, as straight or curved.

Lundholm[5] reports an experimental study of the feeling value of lines. The problem is indicated in the following statement:

Literature about art very often gives us descriptions of masterpieces wherein pure lines are characterized by adjectives that indicate a more or less emotional quality. Thus authors used to write about melancholy lines in the paintings of Perugino, quiet lines in certain classical schools,

[3] Hugo Münsterberg, Principles of art education, p. 82ff.

[4] H. L. Hollingworth, Advertising and selling, p. 142.

[5] The affective tone of lines: Experimental researches. Psychol. Rev., 1921, vol. 28, p. 43–60.

violent lines in the baroque art, etc. Out of these facts there arises a problem. Is the effective character of a line a quality which is bound to the line itself, or is it suggested by the literary subject of the masterpiece? Furthermore, is this quality a phenomenon that appears equally to different observers?

Lundholm presented to a group of eight subjects a series of forty-eight adjectives, which could be grouped into thirteen classes, all the terms in a class being synonyms. Each subject was instructed to draw upon a sheet of white paper 21 by 27 centimeters a line which should express the affective tone of one of the adjectives. Subjects were allowed complete freedom in these reactions with this exception: They "were requested to express the adjectives as far as possible by pure line, not to symbolize sadness by the curve of a melancholy mouth or strength by a line suggesting the contour of a rock formation, etc."

When the lines thus produced were studied there were found to be striking uniformities among the subjects in their reactions to the various adjectives, in the use of curves and angles, slow and fast rhythm and direction of lines. The following condensed table (table 1) showing the reactions of the subjects to the thirteen classes[6] of adjectives is adapted from Lundholm. The names at the top of the table indicate the nature of the line, e.g., curves: big, medium and small; and direction horizontal, up and down. The letters refer to the lines in Figure 1,[7] where the character of the various lines is illustrated. The numbers in the body of the table represent, in terms of per cent, the lines of a given type that were drawn to express each of the thirteen classes of feeling.

Inspection of this table reveals a high degree of agreement in most cases. For example, a big curve (like A, B or C) expresses "sad" in 82 per cent of the cases, "quiet" in 100 per cent of the cases, and "lazy" in 92 per cent of the cases. On

[6] In the table each class is represented by only one adjective. The complete list will be given later (see page 193).

[7] Figure 1 is not taken from Lundholm but forms a part of the writers' experiment and will be described later.

the contrary a line with small angles expresses "hardness" in 46 per cent of the cases. Inspection of the last three columns of table 1 shows the importance of the direction of lines. A line moving downward (like C, F or I) expresses "sad" in 84 per cent of the cases, while a line moving upward (like B, E or H) expresses "merry" in 58 per cent of the cases.

The following passages sum up Lundholm's findings:

TABLE 1

Feelings and the lines that represent them

(Adapted from Lundholm)

	CURVES			ANGLES			DIRECTION		
	Big	Medium	Small	Big	Medium	Small	Horizontal	Up	Down
	ABC	DEF	GHI	JKL	MNO	PQR			
1. Sad	82.0	10.0	5.0				13.0	3.0	84.0
2. Quiet	100.0						81.0	3.0	16.0
3. Lazy	92.0						29.0	4.0	63.0
4. Merry	8.4	18.0	50.0				40.0	58.0	2.0
5. Agitating	2.0	2.0	7.0			14.0	52.0	41.0	7.0
6. Furious	2.5		2.5			21.0	44.0	38.0	13.0
7. Dead	69.0			6.0	6.0		75.0		25.0
8. Playful		13.0	26.0				38.0	50.0	12.0
9. Weak	41.0	6.0	25.0				44.0	9.0	47.0
10. Gentle	75.0	6.0	13.0				75.0		25.0
11. Hard		4.0		4.0	25.0	46.0	54.0	17.0	21.0
12. Serious	69.0	19.0	3.0				38.0	18.0	44.0
13. Powerful	25.0	38.0	4.0	4.0	21.0	4.0	37.0	50.0	13.0

Lines symbolizing states of strong motor expression have short waves and acute angles and lines symbolizing states of weak motor expression have long and low waves; and second, that lines with waves of the former type and acute angles themselves suggest intense motion, while lines with waves of the latter type suggest weak and slow motion. This justifies us in supposing that the effective character of lines has its origin in the suggestion of movement of the line, that it depends upon the idea that this movement in some way imitates the motor expression of an emotion. This supposition becomes greatly strengthened by the fact that the subjects themselves have mentioned the movement as being of importance for the emotional expression of the lines.

Concerning direction of lines:

The downward tendency of a line expresses relaxation, the upward expresses power. The downward tendency expresses faintness, not sufficient strength to keep up. Going downwards expresses losing of energy. The doleful line droops without energy. If it had force it would have ascended higher. Strength is expressed by going upwards. A joyous line also ascends. Joy is an uplifting feeling. A forceful line tends upwards. Thereby it obtains the idea of ambition. A line indicating strength is a line tending upwards, never downwards.

Therefore, it seems to be obvious that even the direction of the lines to a certain extent imitates the motor expression of an emotional state and that consequently the direction is one of the factors that partakes in giving them their affective tone. Direction upwards expresses strength, energy, force, ambition, uplifting feelings, etc., direction downwards, weakness, lack of energy, relaxation, depression, etc.

In the experiment of Lundholm, then, the subjects *drew lines* which represented their feelings. The subjects were necessarily few on account of the labor of classifying and analyzing the lines drawn. Special interest was directed to an explanation of the feelings associated with lines. In the experiment to be reported in this paper the primary interest was the discovery of the feelings that are aroused in *looking at* lines of various kinds, rather than in drawing them. We were interested in the influence of lines in determining the affective reaction to a work of art, a piece of architecture, or an advertisement. If a motor reaction occurs here, it is limited to eye movements and to incipient rather than overt muscular responses of other mechanisms.

The material for this experiment consisted of the following:

1. A set of eighteen lines, representing the simple classes of lines and their directions discovered by Lundholm in his analysis of his subjects' reactions. These were prepared in the form of white lines on a blue background (blueprints) 8½ by 11 inches in size, arranged in the order shown in figure 1. Each line could be identified by means of a letter printed just above it.

2. A sheet containing forty-seven adjectives arranged into thirteen classes. These classes were the same as used by Lundholm except that the adjective "sprightly" was omitted from class 5, and that the adjective "harsh" was put first in class 11. The first word in each class was underlined.

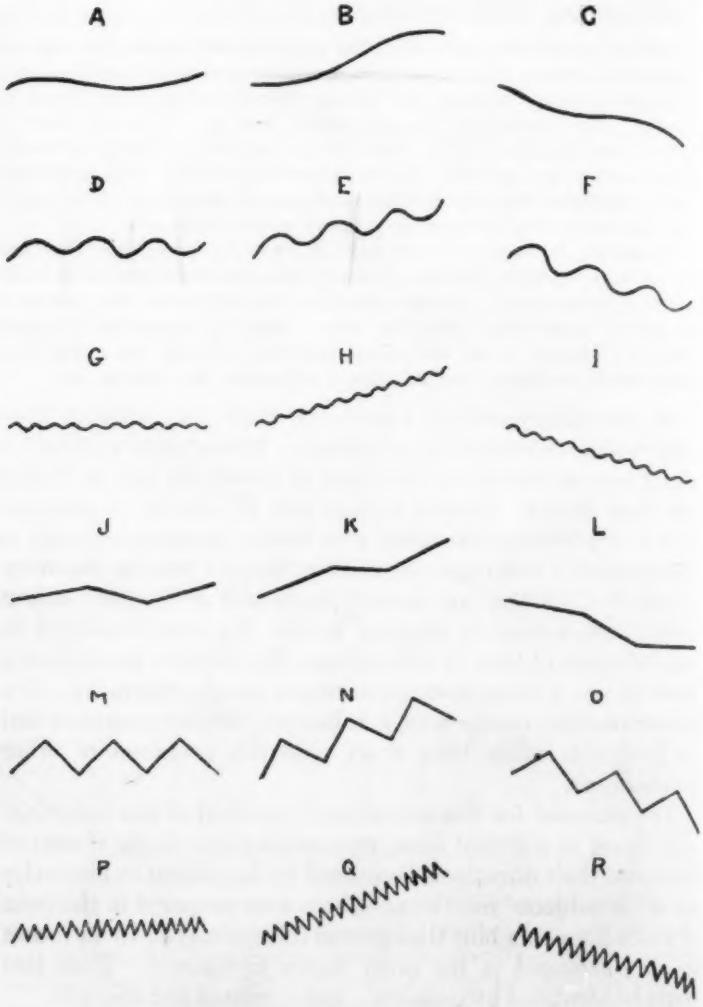

FIG. 1

At the top of the sheet was a set of simple instructions. This sheet is reproduced below. The task to be performed was very simple. Each subject, with the lines before him, began

with class 1 of the adjectives and sought among the eighteen lines that one which best expressed the feelings indicated in class 1. The letter designating the line thus chosen was written at the left of the sheet opposite class 1. Then a line was sought for class 2, and so on until the most appropriate line was indicated for each of the thirteen classes. As stated in the instructions the same line could be used to indicate as many feelings as the subject wished.

Five hundred subjects gave their reactions in the course of the experiment. These were originally treated separately in groups ranging in size from 8 to 60, but the differences among groups were too slight to warrant reporting. The group of five hundred taken as a whole probably represents a fair sampling of educated people.

Below you will find thirteen sets of words, each set indicating a particular feeling state or emotional state. The first word in each set will serve as a cue to the others.

On the accompanying chart you will find a series of lines, eighteen in number, each designated by a letter.

Begin with class 1 of the feelings and find that line on the chart that best expresses to you the feelings that class 1 represents. Mark the letter attached to this line in front of class 1 (under "Letter"). Do the same with class 2 of the feelings, and so on until each of the thirteen classes of feelings has been given a letter. You may use the same line as often as you wish.

LETTER

1. Sad, melancholy, mournful, doleful, sorrowful
2. Quiet, calm, tranquil, serene
3. Lazy, indolent, idle
4. Merry, cheerful, gay, jolly, joyous
5. Agitating, exciting, fiery, brisk, vivacious, lively
6. Furious, angry, cross, vexed, enraged
7. Dead, dull
8. Playful
9. Weak, feeble, faint, delicate
10. Gentle, mild
11. Harsh, hard, cruel
12. Serious, solemn, grave, earnest
13. Powerful, forceful, strong

The lines chosen by the five hundred subjects to represent each of the thirteen classes of feelings may be seen in table 2.

TABLE 2

Feelings and the lines that represent them

	CURVES									ANGLES								
	Big			Medium			Small			Big			Medium			Small		
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1. Sad	8.3	3.0	65.0	0.9	0.6	4.0	0.9	0.0	3.6	1.8	0.2	8.5	0.0	0.2	1.2	0.2	0.2	2.0
2. Quiet	75.3	4.8	3.2	5.8	0.2	0.2	7.1	0.2	0.4	0.8	0.4	0.0	0.8	0.0	0.2	0.4	0.2	0.2
3. Lazy	17.1	6.1	27.2	9.2	1.2	7.3	3.3	0.8	1.8	7.5	1.4	13.0	0.4	0.4	1.4	1.2	0.0	0.8
4. Merry	0.6	7.4	0.4	6.8	38.1	1.2	4.5	19.9	0.8	0.0	2.9	0.2	1.6	5.7	1.0	2.9	5.5	0.6
5. Agitating	0.0	0.2	0.0	0.4	4.0	1.2	1.8	9.2	0.6	0.8	3.3	0.2	8.9	22.6	2.0	11.2	29.5	4.3
6. Furious	1.1	0.4	0.6	1.8	1.8	0.8	1.2	2.2	0.8	1.4	4.8	1.4	4.0	29.2	6.4	6.9	24.4	10.7
7. Dead	13.6	0.8	19.7	2.5	0.2	1.3	10.7	0.0	4.2	13.8	1.0	21.4	0.8	0.0	1.5	5.2	0.2	2.3
8. Playful	0.2	4.0	0.6	11.1	29.1	2.3	8.7	17.8	2.2	1.4	3.2	0.4	2.4	5.9	1.0	4.4	5.0	0.0
9. Weak	7.4	2.8	18.0	1.8	1.2	9.6	12.2	1.8	14.4	8.8	1.8	14.8	0.2	0.0	1.2	1.2	0.4	2.2
10. Gentle	29.2	9.9	4.7	16.4	2.4	2.6	20.6	1.4	2.4	5.7	1.6	0.6	0.6	0.0	0.2	1.2	0.2	0.2
11. Hard	0.4	0.2	0.2	2.7	0.6	0.8	0.0	1.2	1.0	3.7	4.9	2.4	23.9	18.8	15.7	9.4	4.9	9.2
12. Serious	8.8	5.3	2.7	5.5	1.6	1.4	7.6	1.2	1.4	18.9	8.0	6.8	15.8	1.6	2.3	7.8	1.4	1.6
13. Powerful	1.8	7.6	0.0	2.5	1.2	0.0	0.2	1.6	0.4	1.8	16.0	0.6	24.6	21.1	3.3	7.0	8.0	2.7

The class is indicated at the left of the table by the number and the first adjective in the class (see Record Sheet above). The various lines are indicated at the top of the table by the descriptive terms—curves:[8] big, medium, small: angles: big, medium, small—and also by the letters which refer to figure 1. The numbers in the body of the table give the per cent of the sub-

TABLE 3

The influence of form and rhythm and direction

	CURVES			ANGLES			DIRECTION		
	Big	Medium	Small	Big	Medium	Small	Horizontal	Up	Down
	ABC	DEF	GHI	JKL	MNO	PQR	ADG JMP	BEH KNQ	CFI LOR
1. Sad	76.3	5.5	4.5	10.5	1.4	2.4	12.1	4.2	84.3
2. Quiet	83.3	6.2	7.7	1.2	1.0	0.8	90.2	5.8	4.2
3. Lazy	50.4	17.7	5.9	21.9	2.2	2.0	38.7	9.9	51.5
4. Merry	8.4	46.1	25.2	3.1	8.3	9.0	16.4	79.5	4.2
5. Agitating	0.2	5.6	11.6	4.3	33.5	45.0	23.1	68.8	8.3
6. Furious	2.1	4.4	4.2	7.6	39.6	42.0	16.4	62.8	20.7
7. Dead	34.1	4.0	14.9	36.2	2.3	7.7	46.6	2.2	50.4
8. Playful	4.8	42.5	28.7	5.0	9.3	9.4	28.2	65.0	6.5
9. Weak	28.2	12.6	28.4	25.4	1.4	3.8	31.6	8.0	60.2
10. Gentle	43.8	21.4	24.4	7.9	0.8	1.6	73.7	15.5	10.7
11. Hard	0.8	4.1	2.2	11.0	58.4	23.5	40.1	30.6	29.3
12. Serious	16.8	8.5	10.2	33.7	19.7	10.8	64.4	19.1	16.2
13. Powerful	9.4	3.7	2.2	18.4	49.0	17.7	37.9	55.5	7.0

jects choosing any given line. Thus, for "sad" 8.3 per cent of the five hundred judges chose line A which is a big curve in the horizontal position; 65 per cent chose C which is a big curve in the descending position; 1.8 per cent chose J which is a big angle in the horizontal position; and 2 per cent chose R which is a small angle in the descending position.

From this detailed table others may be compiled to show the influence of various characteristics of the lines. Thus, table 3 combines the percentages for a given shape of line regardless

[8] In this report the curved or angular character of the line will be called its "form," the size of the waves or angles will be called "rhythm" and the direction will be referred to simply as "direction."

of its direction and for a given direction regardless of shape. In this table it appears that "sad" is represented as a big curve by 76.3 per cent of the subjects (the sum of A, B and C in table 2); as a medium curve by 5.5 per cent; and as a small curve by 4.5 per cent. It is represented by a descending or "downward" line in 84.3 per cent of the subjects. The figures in table 3 may be compared directly with those in table 1 which contains Lundholm's data. It should be remembered that the most striking difference in the methods of obtaining these data is that Lundholm's subjects drew lines to represent feelings while our subjects chose from a set of 18 lines certain ones which represented their feelings.

In table 4 a rough comparison is made between these two sets of data. The feeling classes are arranged, according to the amount of agreement, into three groups called "agreement," "agreement moderate" and "disagreement." The "agreement" group may be further divided into two subgroups, namely, the first three where agreement is very close, and the second three where there is a shift of emphasis between medium and fast rhythm. The second group contains cases in which an additional type of line appears in either set of data, but in which there is no shift from curves to angles or vice versa. The third group, "disagreement," contains cases where there is a shift from curves to angles (or vice versa) or a considerable discrepancy within the curve or angle group (as in 13—powerful).

In the "disagreement" group, class 7 (dead) does not represent any serious disagreement since the shift is from big curves to big angles; that is, it seems to be the same slow rhythm of movement that is important in expressing "sad." In the case of class 9 (weak) there are big curves and small curves in both sets of data. The additional type of line is the big angle. The other discrepancies are due, probably, to differences in interpretation of the adjectives. This is especially true in the case of "serious," as shown by introspective reports of the subjects. Lundholm with eight selected subjects could be sure of greater uniformity in interpretation than could be attained with five hundred subjects who followed printed directions.

TABLE 4

Comparison of the two experiments

	LUNDHOLM	POFFENBERGER AND BARROWS
Agreement		
1. Sad	Big curves (82.0)	Big curves (76.3)
2. Quiet	Big curves (100.0)	Big curves (83.3)
3. Lazy	Big curves (92.0)	Big curves (50.4)
4. Merry	Small curves (50.0) Medium curves (18.0)	Medium curves (46.1) Small curves (25.2)
8. Playful	Small curves (26.0) Medium curves (13.0)	Medium curves (42.5) Small curves (28.7)
11. Harsh	Small angles (46.0) Medium angles (25.0)	Medium angles (58.4) Small angles (23.5)
Agreement—moderate		
5. Agitating	Small angles (14.0)	Small angles (45.0) Medium angles (33.5)
6. Furious	Small angles (21.0)	Small angles (42.0) Medium angles (39.6)
10. Gentle	Big curves (75.0)	Big curves (43.8) Small (24.4) Medium (21.4)
Disagreement		
7. Dead	Big curves (69.0)	Big angles (28.4) Big curves (28.0)
9. Weak	Big curves (41.0) Small curves (25.0)	Small curves (28.4) Big curves (28.2) Big angles (25.4)
12. Serious	Big curves (69.0)	Big angles (33.7) Medium angles (19.7) Big curves (16.8)
13. Powerful	Big curves (25.0) Medium curves (38.0) Medium angles (21.0)	Medium angles (49.0) Big angles (18.4) Small angles (17.7)

Certainly this comparison shows the agreements to be more striking than the disagreements. The question arises as to whether the disagreements that do occur are such as one would expect to find if they were due to the one differing factor in the experiments, namely, that in one case lines were drawn and in the other they were looked at. Lundholm speaks of two types of adjectives, those carrying "strong motor expression" and those carrying "small motor expression." In the latter group are classes 1, 2 and 3, and in the former are classes 4, 5 and 6. It is in the cases of classes 1, 2 and 3 that the closest agreement is found between the two sets of data, that is, where motor expression is weak. Thus, one might conclude that the two experiments, one involving motor expression in the form of line drawing movements and the other involving no such motor expression agree best in the case of those feelings whose motor expression is weakest (or where the distinction between the two experiments is at its minimum). However, in the case of classes 7, 9 and 10 where there would seem to be "small motor expression" the agreement between the two experiments is not so close. Still, it must be remembered that even if the motor factor is the important factor in the feeling tone of lines, eye movements and implicit movements of other mechanisms may be good substitutes for the actual line drawing movements, or may even be more important than these.

The nature of the agreements and disagreements revealed by this comparison suggests that it is important to discover what characteristics of the lines, namely, curves or angles, rhythm or direction have the most weight in determining the feeling reactions. An attempt will be made to interpret the data in this fashion in the course of our report.

Let us first compare the direction factor in the two sets of data. Table 1 contains these figures for the Lundholm experiment, and table 3 contains the same for our experiment. The comparison is presented in table 5. As in table 4 we can make three groupings, "agreement," "agreement moderate" and "disagreement." The amount of agreement is determined simply by inspection, as the material does not warrant a more

TABLE 5

The influence of direction

	LUNDHOLM	POFFENBERGER AND BARROWS
Agreement		
1. Sad	Down (84.0)	Down (84.3)
2. Quiet	Horizontal (81.0)	Horizontal (90.2)
3. Lazy	Down (63.0) Horizontal (29.0)	Down (51.5) Horizontal (38.7)
4. Merry	Up (58.0) Horizontal (40.0)	Up (79.5) Horizontal (16.4)
8. Playful	Up (50.0) Horizontal (38.0)	Up (65.0) Horizontal (28.2)
9. Weak	Down (47.0) Horizontal (44.0)	Down (60.0) Horizontal (31.6)
10. Gentle	Horizontal (75.0)	Horizontal (73.7)
13. Powerful	Up (50.0) Horizontal (37.0)	Up (55.5) Horizontal (37.9)
Agreement—moderate		
5. Agitating	Horizontal (52.0) Up (41.0)	Up (68.8) Horizontal (23.1)
7. Dead	Horizontal (75.0) Down (25.0)	Down (50.4) Horizontal (46.6)
Disagreement		
6. Furious	Horizontal (44.0) Up (38.0) Down (13.0)	Up (62.8) Down (20.7) Horizontal (16.4)
11. Harsh	Horizontal (54.0) Down (21.0) Up (17.0)	Horizontal (40.1) Up (30.6) Down (29.3)
12. Serious	Down (44.0) Horizontal (38.0) Up (18.0)	Horizontal (64.4) Up (19.1) Down (16.2)

refined method. Here again the resemblances between the two sets of data are more striking than the differences. The same relationship between weak motor expression and agreement between the two sets of data and strong motor expression and disagreement holds as appeared in table 4.

The remainder of the report will be concerned with an analysis of our own data from the five hundred subjects. The preceding comparison of the two sets of data raises two questions: (1) What are the essential characteristics of lines representing the different classes of feelings? and (2) what is the relative importance of these different characteristics? The first of these questions may be answered by reference to table 6. Here we find in what per cent of the cases a curve was chosen to represent a class of feelings; in what percent of the cases an angle was chosen; also what rhythm and what direction of line expressed the feeling best. The figures are obtained by totalling the percents shown in table 2. Thus "sad" was represented by some kind of curve in 86.3 per cent of the cases (Table 2, A, B, C, D, E, F, G, H, I,); and by some kind of angle in 14.3 per cent of the cases (table 2, J, K, L, M, N, O, P, Q, R,). "Sad" was also represented by a slow rhythm in 86.8 per cent of the cases (table 2, A, B, C, J, K, L); and by a line in the downward direction in 84.3 per cent of the cases (table 2, C, F, I, L, O, R).

The brief statement in the last column expresses the dominant character of the line representing any of the 13 classes of feelings. Note that the cases of the slow, descending curve are "sad" "lazy", and "weak;" the cases of the slow horizontal curve are "quiet" and "gentle." The medium rising curve represents "merry" and "playful." The rapid or medium rising angle represents "agitating," "furious" and "powerful."

The figures in table 6 do not, however, enable us to answer the second question which concerns the relative importance of the various characteristics of the lines. The total per cents represent the combination of different numbers of lines, (e.g., the curve includes nine lines and the rhythm includes 6 lines). If we find the average per cent per line by dividing by the

TABLE 6

Feelings and their appropriate lines

	FORM		RHYTHM			DIRECTION			
	Curve	Angle	Slow	Medium	Fast	Horizontal	Up	Down	
1. Sad	86.3	14.3	86.8	6.9	6.9	12.1	4.2	84.3	Slow descending curve
2. Quiet	97.2	3.0	84.5	7.2	8.5	90.2	5.8	4.2	Slow horizontal curve
3. Lazy	74.0	26.1	72.3	19.9	7.9	38.7	9.9	51.5	Slow descending curve
4. Merry	79.7	20.4	11.5	54.4	34.2	16.4	79.5	4.2	Medium rising curve
5. Agitating	17.4	82.8	4.5	39.1	56.6	23.1	68.8	8.3	Rapid rising angle
6. Furious	10.7	89.2	9.7	44.0	46.2	16.4	62.8	20.7	Rapid or medium rising angle
7. Dead	53.0	46.2	70.3	6.3	22.6	46.6	2.2	50.4	Slow horizontal or descending curve or angle
8. Playful	76.0	23.7	9.8	51.8	38.1	28.2	65.0	6.5	Medium rising curve
9. Weak	69.2	30.6	53.6	14.0	32.2	31.6	8.0	60.2	Slow descending curve
10. Gentle	89.6	10.3	51.7	22.2	26.0	73.7	15.5	10.7	Slow horizontal curve
11. Harsh	7.1	92.9	11.8	62.5	25.7	40.1	30.6	29.3	Medium horizontal angle
12. Serious	35.5	64.2	50.5	28.2	21.0	64.4	19.1	16.2	Slow horizontal angle
13. Powerful	15.3	85.1	27.8	52.7	19.9	37.9	55.5	7.0	Medium rising angle

number of lines added to get a given total, we will have all figures on a comparable basis. Then the largest figure will represent the characteristic of the line which in a given case has the greatest influence. Table 7 presents the figures reduced to such a comparable basis. The classes are grouped into pairs of opposites for easy comparison. The three classes which do not permit of this grouping, namely, "lazy," "furious" and "dead" are placed at the bottom of the table.

TABLE 7

Relative value of different line characters

	DIRECTION			RHYTHM			FORM	
	Horizontal	Up	Down	Slow	Medium	Fast	Curve	Angle
1. Sad	2.0	0.7	14.1	14.3	1.2	1.2	9.6	1.6
4. Merry	2.7	13.2	0.7	1.9	9.1	5.7	8.9	2.2
12. Serious	10.7	3.2	2.7	8.4	4.7	3.5	3.9	7.1
8. Playful	4.7	10.8	1.1	1.6	8.6	6.4	8.4	2.6
2. Quiet	15.0	1.0	0.7	14.1	1.2	1.4	10.8	0.3
5. Agitating	3.9	11.5	1.4	0.8	6.5	9.4	1.9	9.2
10. Gentle	12.3	2.6	1.8	8.6	3.7	4.3	10.0	1.1
11. Harsh	6.7	5.1	4.9	2.0	10.4	4.3	0.8	10.3
9. Weak	5.3	1.3	10.0	8.9	2.3	5.4	7.7	3.4
13. Powerful	6.3	9.3	1.2	4.6	8.8	3.3	1.7	9.5
3. Lazy	6.5	1.6	8.6	12.1	3.3	1.3	8.2	2.9
6. Furious	2.7	10.5	3.5	1.6	7.3	7.7	1.2	10.0
7. Dead	7.8	0.4	8.4	11.7	1.1	3.8	5.9	5.1

By reading across the table and finding the largest figure we see that in the case of "sad," direction and rhythm of line are equally important while form is less important; in the case of "merry" direction is most important while rhythm and form are less important; in the case of "harsh," rhythm and form are equally important and more so than direction; in the case of "furious," direction and form are most important, and rhythm

least important; in the case of "dead," rhythm is most important, direction next and form least important. Now, if we add together the largest scores for direction, for rhythm and for form respectively we get the following totals, 141.1, 132.0 and 115.0 from which we may conclude that in expressing the feelings included in this study, direction of line is generally most important, rhythm next and form least important.

The same table with its groupings into contrasting feelings shows the relationship between lines representing contrasting feelings in respect to direction, rhythm and form. The larger the number in this table, the greater is the effect of the factor which it represents.

Our experiment offers little in the way of an explanation of the feeling reactions described. A typical introspective report showed the relation between the reactions to the lines and certain popular expressions, as for instance, "down in the dumps," "up in the air," "sharp tongue," "rollicking time." Such ideas came to mind in reacting to "sad," "merry," "playful," etc. Again, there was the association of the idea of the normal with a horizontal line and the departures from the normal or horizontal became indicative of "harshness," "furious," "agitating," etc. Such reports are of little use in determining the real basis of the feeling reactions. It may be that the reactions to the lines are due to these simple associations or that the associations themselves are due originally to the immediate responses to the lines. The predominance of certain lines for expressing certain feelings in a group of subjects of this size might suggest that the feeling reactions are immediate and fundamental responses. Another type of introspective report showed a kind of emotional warmth or glow aroused by curves, especially the larger curves, while the sharp angles gave a feeling of roughness or conflict that could not be further analyzed. For a discussion of the analysis of the feeling reactions to lines the reader is referred to the article by Lundholm.

If the feelings are to be played upon by means of lines in practical life, it makes little difference whether the particular feelings aroused by a line are immediate or the result of associa-

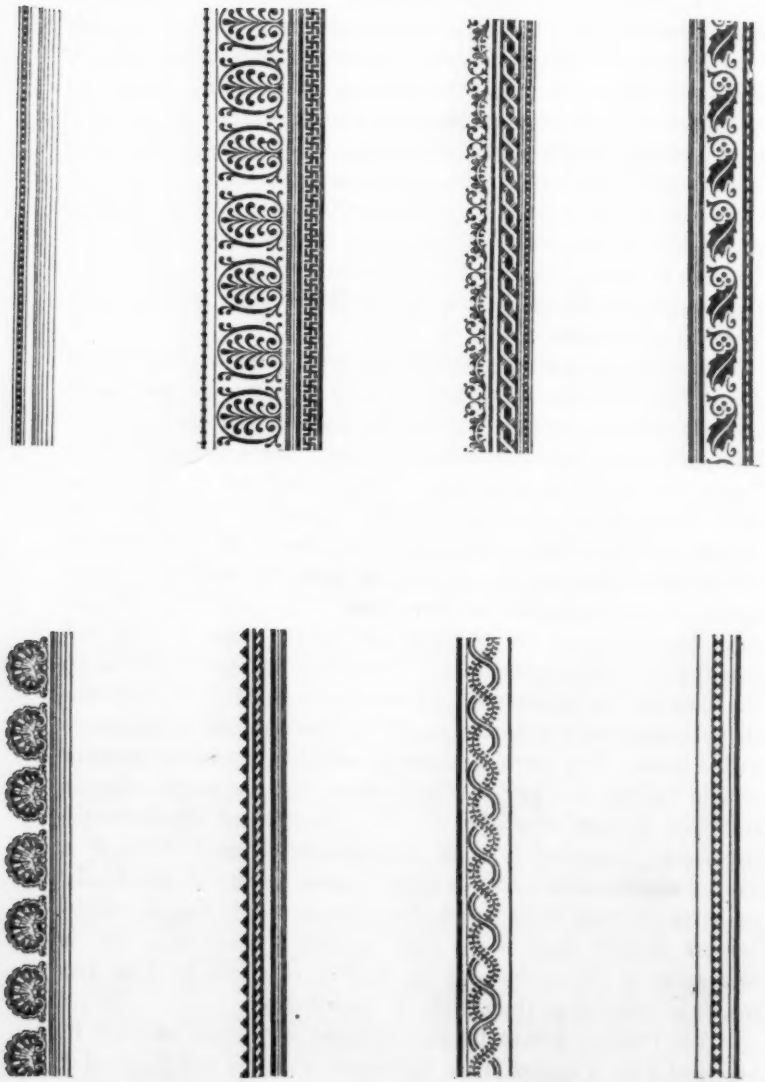

Fig. 2

tion, except in regard to their universality and their stability. These are matters that could be measured by getting a wider range of subjects and repeating the tests over a long period of time. The results obtained from this study have some bearing upon those forms of art that are created to influence people's reactions. Thus in advertising the aim is to influence the market for some commodity and no labor or expense is spared to create a pleasing and appropriate atmosphere. Along with appropriate colors and color combinations, appropriate type faces, appropriate balance of light and shade, appropriate line characters may take their place as factors creating favorable responses. Figure 2 shows a series of border designs that form the common stock of the advertiser and the printer. These vary strikingly in rhythm and quality. As far as the writers know, border designs in advertising are prepared merely for their general esthetic effect and for the purpose of novelty. They might be more effectually used by taking account of the relation between quality, direction and rhythm of line and the feelings that are aroused in seeing them.

FIG. 2

AN EVALUATION OF SOME INFORMATION QUESTIONS

WILLIAM R. WILSON, GERTRUDE WELSH AND HAROLD GULLIKSEN

University of Washington

One of the inescapable annoyances of the maker of mental tests is the individual who claims that certain performances required by the tests are "obviously" not related to general mental ability. There are few testers who have not suffered from the insistence that there is no relation between the ability to discriminate between synonyms and antonyms and intelligence or that "it stands for reason" that school grades in arithmetic are better measures of intelligence than a test of general information. The natural impatience of the psychologist with this point of view is somewhat restrained by the memory that he himself has only very recently given up the compilation of mental tests out of elements which his "common sense" told him were good measures of mental ability. The random, empirical, search for significant test performances is, in fact, so recent that the majority of testers can still remember when the acceptance of this new method seemed the rejection of reason in favor of a blind groping. The "common sense" method of selecting test elements is by no means extinct in the finer details of test compilation. The present paper reports a small extension of the empirical method that has proven itself of value in selecting information questions as components of mental test batteries.

Three years ago in attempting to evaluate the various parts of the Army Alpha test it became quite apparent that nearly one third of the information questions contributed nothing significant to the final score and that a few questions were answered correctly more often by dull students than by bright.

It was quite impossible to tell with any accuracy by inspection alone the value of a question as a measure of intelligence. The writer does not know in what way the information test questions of the most recent batteries of tests have been selected, but with many of the standard tests the judgment of the compiler was entrusted with this rather difficult task. The assumption has often been implicit that while any particular question may be worthless the score obtained by application of all the questions will have value. It speaks well for the judgment of the inventors of our tests that their information questions are a valuable part of the battery. It is possible, however, by an extension of the empirical method to increase very greatly the validity and reliability of information questions.

In the preparation of a mental test to be given to freshmen of the University of Washington in the fall of 1921 the information test elements were selected from an original list of four hundred questions. A tentative trial of these questions showed that for various reasons many were unsuitable and the number was finally reduced to two hundred thirty. These two hundred thirty questions were drawn from various sources. Sixty were adapted from Whipple's test of general information. Some forty were selected from Alpha forms. The remaining questions were largely original. The two hundred thirty questions in mimeographed form were given to 400 freshmen members of a class in general psychology. Not more than fifty questions were given in any single day and the students were requested to answer every question to the best of their ability even though the answer required guessing.

Three weeks before the information questions were answered the class had been given an examination of general mental ability of the "cycle" type. This examination which required thirty minutes of uninterrupted work contained eight conventional types of test adjusted to the mental level of college freshmen. It has somewhat greater validity and reliability than the Army Alpha with which it correlates, in the case of college freshmen, 0.78. The 320 members of the class who had answered all the information questions and had also taken the

mental test were divided into quartiles on the basis of mental test score. The per cent of each quartile answering each information question correctly was then determined.

The discriminative value of the separate questions can be shown in various ways. If it is desired to obtain a set of questions which will show a high correlation with a test of intelligence a good measure of the value of a question is the cumulative total of the difference in per cent of students in the various quartiles answering it correctly. After a number of trials it was decided to give to each question a numerical value which was the difference in per cent of students in the first and fourth quartiles answering the questions correctly plus the difference in per cent of students in the second and third quartiles answering the questions correctly. Thus a question answered correctly by 20, 35, 45, and 65 per cent of the respective quartiles would have a value of 45 plus 10 equals 55. If the purpose of the test is to set off sharply those of inferior intelligence, those questions will be selected which show a large step between the lowest and the next quartile, decile, or other unit. Questions dividing the group in any other way desired can be similarly selected. This is the method used by the perfectors of trade tests.

In table 1 are shown the fifty best questions of the two hundred thirty evaluated. In table 2 is shown the per cent of each quartile answering each question correctly (when $\frac{1}{4}$ has been deducted for chance successes) and the difficulty in terms of S.D. with the range of ability assumed to be 2.5 S.D. The column headed "value" shows the sum of the differences between quartiles by the method already described.

With the results of an actual try-out before one it is often easy to see why a question has no value as a measure of intelligence. Many questions are so easy that even the least intelligent answer them correctly and thus the group is not distributed. A typical question of this group is, "The watt is a measure of HEAT SOUND ELECTRICITY HUMIDITY." Ninety-eight per cent of the highest quartile and 92 per cent of the lowest answered it correctly. One of the truisms of testing is that questions should not be too easy. Who, however, would

TABLE 1

The forty best questions

1. Samuel Clemens was a CRITIC HUMORIST ARTIST STATESMAN
2. "The Makings of a Nation" is an advertisement of a TOBACCO FLOUR BAKING POWDER HEALTH FOOD
3. A "Bohemian" is DISHONEST UNCONVENTIONAL EARNEST MUSICAL
4. "The Autocrat of the Breakfast Table" was written by HOLMES POE IRVING LONGFELLOW
5. Delphi is known for its WELLS TEMPLES ORACLE VASES
6. Romulus was a mythical king of PERSIA GREECE ASSYRIA ROME
7. The term gambit is used in CHESS TANNING PUTTEES HUMOR
8. Saturn was a god of the EGYPTIANS KELTS ROMANS GREEKS
9. A midiron is used in HOCKEY GOLF CRICKET WAR
10. "Paul Revere's Ride" was written by EMERSON BRYANT LONGFELLOW HOLMES
11. An ideally perfect commonwealth is called a REPUBLIC UTOPIA MONARCHY COMMUNE
12. Walt Whitman wrote MUSIC DRAMA ART CRITICISM FREE VERSE
13. The formula for common salt is NaCl H_2SO_4 H_2O MnO_2
14. The blowing up of the Maine occurred in 1900 1889 1898 1897
15. Bancroft was a POET HISTORIAN DRAMATIST LECTURER
16. Among the amphibians are SNAKES FROGS FISHES MAMMALS
17. John Wesley was most famous in LITERATURE SCIENCE WAR POLITICS
18. An entree may be a ROAST DESSERT BEVERAGE APERTURE
19. The author of "The Scarlet Letter" is HAWTHORNE POE STEVENSON KIPLING
20. Aniline Dyes are obtained from FLOWERS INSECTS COAL TAR SEAWEEDS
21. Alexander the Great was a ruler in FRANCE ROME GREECE DENMARK
22. The Bastile was in LONDON PARIS ROME VIENNA
23. Puer means BOY SHAME CLEAR LOVELINESS
24. A substance that is not ordinarily a gas is NITROGEN CHLORINE CARBON HYDROGEN
25. The chameleon is a BIRD REPTILE INSECT FISH
26. Eugene Field is noted for his CHILDREN'S POEMS ESSAYS SONGS RIDDLES
27. Amy Lowell is best known as an ACTRESS PAINTER SOCIAL WORKER POET
28. Millet is famous in PHILOSOPHY MUSIC ART LITERATURE
29. Pasteur discovered a process of PRINTING STERILIZATION BLASTING MINING

TABLE 1—*Continued*.

30. Papyrus was used for SMOKING WRITING EATING FUEL
31. Braillé refers to ACCOUSTICS RAISED WRITING WEAVING CALCULUS
32. Malthus' Law concerns POPULATION COINAGE TARIFF SHIPPING
33. The Corona is a kind of PHONOGRAPH MULTIGRAPH ADDING MACHINE TYPEWRITER
34. The agora was a MARKET PLACE SIREN BUILDING FABLE
35. Atilla was FRENCH AFRICAN HUN ENGLISH
36. Darwin was most famous in LITERATURE SCIENCE WAR POLITICS
37. Falstaff appears in ROMOLA VANITY FAIR OLIVER TWIST HENRY IV
38. Buccaneers were PIRATES EXPLORERS SPIES DIPLOMATS
39. An epigram is usually TEDIOUS INVOLVED BRIEF AMBIGUOUS
40. Addison was a DRAMATIST POET ESSAYIST NOVELIST

TABLE II.

Twenty-five typical poor questions

1. The original free verse writer was MAX EASTMAN H. L. MENCKEN AMY LOWELL WALT WHITMAN
2. The messenger of the gods was VULCAN HERMES PAN DIONYSUS
3. Portugal is a MONARCHY REPUBLIC DEMOCRACY OLIGARCHY
4. Rococo means COBBLED SIMPLE TRIPPING FLORID
5. The hemiptera are WORMS INSECTS BIRDS FISHES
6. Glycogen is stored in the HEART LUNGS THYROID LIVER
7. Chlorine is an OBLONG MANTLE DYE ELEMENT ANESTHETIC
8. Amphioxos is a LANCELET FROG ANNULATE MAMMAL
9. The Suez Canal was built by FRANCE SPAIN GERMANY ENGLAND
10. The howitzer is a kind of MACHINE-GUN RIFLE CANNON PISTOL
11. 1827 is the date of the first TELEPHONE STEAMBOAT RAILROAD CANAL
12. "The Gold Bug" is an IDYL EPIC LYRIC SHORT STORY
13. Ohm's law is used in HEAT ELECTRICITY LIGHT SOUND
14. Nox was the goddess of LIGHT LOVE DARKNESS BEAUTY
15. Medes refers to RELICS INSTITUTIONS GODS NATION
16. Enzymes are found in the NERVES STOMACH BLOOD BONES
17. A vertebra is a section of the LEG BONE MUSCLE SPINE
18. The number of teeth in an adult is 32 30 28 34
19. The early Egyptians disposed of their dead by BURNING EMBALMING BURIAL EXPOSURE
20. A whale is classified as a FISH MAMMAL REPTILE AMPHIBIA
21. The Delco System is used in PLUMBING FILING IGNITION CATALOGUING
22. Aggassiz was an EXPLORER NATURALIST DIVINE SOLDIER
23. Clemenceau is an INVENTOR POET SOLDIER STATESMAN
24. Silk comes from a kind of CRAB WORM BEETLE PLANT
25. To set fire to a house is called LARCENY INCEST MAYHEM ARSON

TABLE 3

The per cent of each quartile answering each of the forty best questions correctly, the final value assigned, and the difficulty of the question

QUESTION	Q1	Q2	Q3	Q4	VALUE	S.D.
1	63	56	36	21	62	51.5
2	37	22	10	−5	54	59.5
3	58	49	27	26	54	52.5
4	56	46	37	12	53	52
5	62	50	38	21	53	52
6	59	80	43	44	52	48.5
7	30	28	6	2	50	59
8	40	21	8	6	47	59
9	46	44	31	12	47	54
10	44	53	30	21	46	52.5
11	49	45	35	14	45	53.5
12	73	70	58	41	44	65.5
13	72	56	51	33	44	49
14	49	34	18	12	43	55.5
15	58	50	34	31	43	51.5
16	43	27	16	12	42	57
17	51	48	36	22	41	52.5
18	51	28	30	8	41	55.5
19	52	53	36	29	40	52
20	35	35	29	2	39	56.5
21	44	39	19	26	38	54.5
22	64	64	54	36	38	48.5
23	44	30	24	12	38	56
24	61	56	47	33	37	50
25	41	32	17	20	36	56
26	59	61	57	29	34	49.5
27	33	30	17	13	33	57.5
28	39	31	33	4	33	56
29	70	57	51	44	32	48.5
30	75	72	59	56	32	46
31	35	23	12	14	32	58
32	26	21	23	−8	32	60
33	66	68	55	48	31	47.5
34	28	21	2	17	30	59.5
35	59	27	26	30	30	54.5
36	71	67	65	43	30	47
37	28	18	14	2	30	59
38	71	63	54	50	30	47
39	61	52	44	39	30	50
40	47	47	37	27	30	52.5

have said in advance that 98 per cent of freshmen would mark the correct answer in "Fulton's Folly" was the name of a BOOK AIRPLANE STEAMBOAT COTTON GIN" (this before the widely attended moving picture) and only 41 per cent mark

TABLE 4

The per cent of each quartile answering each of the twenty-five poorest questions correctly, the final value assigned, and the difficulty of the question

QUESTION	Q1	Q2	Q3	Q4	VALUE	S.D.
1	−3	16	24	21	−32	60.5
2	10	31	19	14	28	56
3	21	23	21	44	−21	67.5
4	2	4	4	4	−2	68.5
5	17	15	24	16	−8	59
6	4	19	14	10	−1	62
7	39	35	40	49	−5	50.5
8	−20	−16	−18	−14	−4	
9	71	72	74	−71	−2	44
10	37	27	33	32	−1	54.5
11	9	6	12	11	−8	63
12	53	67	72	53	−5	47
13	53	48	49	55	−3	49.5
14	10	14	19	15	−10	60.5
15	19	19	47	0	−9	58
16	30	15	22	24	−1	57.5
17	73	68	73	70	−2	44.5
18	62	64	44	50	8	52
19	66	66	63	64	5	46.5
20	48	27	40	33	2	53.5
21	48	47	44	44	7	51
22	13	15	11	13	4	61
23	74	66	69	66	5	45
24	75	75	74	69	7	43.5
25	32	39	37	29	5	54

correctly "The Makings of a Nation is an advertisement of a TOBACCO FLOUR BAKING POWDER HEALTH FOOD" when the answer stares at them from every bill board? This last question, surprisingly or not, was the second best of the entire list. Among questions so difficult that even the upper quartile

gave only the approximate chance score were those asking the location of the Pantheon and the battle of Waterloo, the nature of a soviet, the authorship of the "Rise of the Dutch Republic" and the nature of asteroids and of catalepsy.

Since test elements are often evaluated one year for use the next, it becomes desirable to know the stability of questions from year to year. Fifty of the two hundred thirty information questions used in this study were given to classes in psychology under similar conditions in successive years. In the intelligence test given to all freshmen students the mean score for the entering class of 1922 was 59.2 and for the class entering in 1923, 59.4 points. The dispersion of scores for the two classes was the same. The mean difficulty of the fifty information questions was 51.2 for the class of 1922 and 51.4 for the class of 1923. The mean value of the questions as measured by the cumulative totals of differences between quartiles was 18.0 for each class. The average deviation of the differences in difficulty of the questions was 3.7. The average deviation of the cumulative difference between quartiles was 3.0. The value of the questions is seen to be rather more variable than their reliability. However, 17 of the 20 best questions selected with the 1922 class hold their rank among the best 20 with the entering class of 1923. Although the successive freshmen classes had given almost identical scores in every trait measured the high stability of the information questions was something of a surprise. Whether or not the results found here are typical can be shown only by comparisons extending over a number of years.

In the absence of actual trial there is no justification for the assertion that questions found valuable at the University of Washington will have even approximately the same value when given to students in other localities. It is highly probable that in spite of the educational and cultural uniformity of the United States there are large local differences in the kinds of information possessed by college freshmen. These differences could be brought out in an interesting fashion if the various departments that have given the Army Alpha test to their students

would re-score the papers of those who attempted every question in Test 8 and announce the per cent of correct answers given on each test element.

CONCLUSIONS

1. The empirical method should be extended to include each element in an information test.

2. It is impossible to determine with accuracy the value of an information question by inspection alone.

3. The stability of difficulty and distributing value of information questions is sufficiently large so that questions can be evaluated one year for use the next.

VALIDITY OF CHARACTER JUDGMENTS BASED ON EXTERNAL CRITERIA

GLEN U. CLEETON

Carnegie Institute of Technology

AND F. B. KNIGHT

University of Iowa

INTRODUCTION

Industry, fully aware of the advantage of an accurate and dependable means of estimating men and women, gives ear to any method of judging character which is at all plausible and which is earnestly presented. At the present time many so-called character analysts, consultants, and experts are presenting both plausibly and earnestly methods of judging character based on physical criteria, such as head measurements. Respectable psychology almost without exception repudiates such methods and its foundations on physiological and neurological grounds. The futility of character judgments by any form of phrenology is refuted *theoretically* to the queen's taste in a conclusive onslaught by Knight Dunlap in an article published in *The Scientific Monthly*, vol. XV, no. 2, August, 1922.

But business uses phrenological methods of character judgment rather freely and with some satisfaction. Science and psychology for their own purposes need only theoretical refutation. Business evidently is not sufficiently impressed with theory. Perhaps statistical refutation will help in this connection and round out even the academic treatment of phrenology. This study furnishes such statistical refutation.

THE METHOD OF THE PRESENT STUDY

First: Systems of character judgments by external signs were searched to find definite physical traits varying amounts of which are claimed to indicate varying amounts of some character trait. Measurement of such physical traits were made.

Second: Groups of individuals were judged *casually* for specific character traits. There is a possibility that character may be judged by external signs and then the wrong signs reported. That is, by intuition true judgment may be made but the judges are unaware of how judgments are made; and so very naturally report some method.

Third: Close associates who knew the characters of the members of each group carefully rated the members of each group to establish the facts relative to the varying amounts of certain traits possessed by members of each group.

Fourth: The three measurements were correlated.

GENERAL CONCLUSION

For the busy reader the following sentence contains the meat of this statistical refutation of methods of character judgments by external criteria. The average of 201 correlations between variations in physical traits purported to reveal variations in character traits and our criteria was 0.000 with the correlations varying from 0.000 as chance would account for.

Statistically: In a normal distribution 50 per cent of the cases come within 1 P.E.; 51.24 per cent of the correlations between physical traits and character traits came within 1 P.E. In a normal distribution 82.26 per cent of the cases fall within 2 P.E. Of the 201 correlations reported here 83.08 per cent of them come within 2 P.E. In a normal distribution 95.70 per cent of the cases come within 3 P.E. In this study 98.01 per cent of the correlations come within 3 P.E. In a normal distribution 99.30 per cent of the cases fall within 4 P.E. One hundred per cent of the correlations in this study fall within 4 P.E. Statistically then the correlation between variations in physical traits and character traits *is* 0.000 (within the reliability of our data).

CHARACTER TRAITS STUDIED

The following character traits were the ones used in this study.

1. Sound Judgment
2. Intellectual Capacity
3. Frankness
4. Will Power
5. Ability to Make Friends
6. Leadership
7. Originality
8. Impulsiveness

These traits were used primarily because a study of the literature of both modern and historic phrenology revealed great disagreement among the doctors as to just what various physical symptoms really indicate. There was less disagreement among the phrenologists on these traits than upon others.

It is noteworthy that when allowances for form of statement due to a growing language are made the writings on character analysis of the present day are practically the same as they were one hundred and twenty years ago and strikingly similar to the pronouncements of the employment consultant Theophrastus of Eresos who lived 372 to 288 B.C.

THE MEASUREMENTS OF PHYSICAL TRAITS

Since absolutely accurate and tested anthropometric instruments seemed to avoid an error of about 1 mm. the slightly additional reliability of such instruments was not considered necessary. Character analysts use their eyes. We used instruments which must have made our measure at the worst far more accurate than theirs at the best. Our kit contained

(a) Standard spreading calipers
(b) Sliding compass
(c) Steel tape
(d) Head square—constructed for the purpose upon the principle of the multiple sliding compass to facilitate measurements of distances from the meatus to various sections of the cranium.

The following are samples of the measurements made and correlated against our criteria. The basis for the selection of these measurements was the fact that, in one or more of the many authoritative accounts of character analysis, these measurements were purported to measure some trait under study. In many instances the measure used was explicitly stated to reveal the character trait study. In some instances inference from rather vague assertions had to be made.

It is needless to repeat here the lists of physical factors used in connection with all the character traits studied. In testing the hypothesis that certain physical factors indicated Will Power 36 physical factors were measured. In testing the hypothesis that certain physical factors indicated Friend Making Ability 13 physical factors were measured. In testing the hypothesis that certain physical factors indicated the trait Leadership 30 factors were measured. For the trait Originality 23 factors were studied. For the trait Impulsiveness 20 physical factors purporting to indicate this trait were used in this study.

SUBJECTS OF THE STUDY

Neglecting certain preliminary work the study was based on three groups, 10 in each. Two of these groups were members of two national sororities. The other group were members of a national fraternity. The main reason for using members of close social organizations was the fact that judgments of the several aspects of their character could be obtained. Each member of all our groups could be rated by a much larger group of judges who knew intimately not only the individual subject rated but also every other member of his group. In this way a man to man rating could be set up and many of the pit-falls of ratings overcome.

THE RELIABILITY OF THE RATINGS

The ratings of the close associates. These ratings were used as the criteria of the character traits. The reliabilities of these

TABLE 1

Outline of factors used in the study of trait judgment

Hypotheses: That judgment is indicated by the following physical factors:

A. Large cranial development
  Measured by:
    (1) Circumference—anterior inferior to posterior central
    (2) Circumference plus height of head from meatus vertical
    (3) Length of head—glabella to occipital protuberance plus height plus maximum breadth

B. High development of anterior lateral region
    (4) Width of head at temples

C. High development of upper part of forehead
    (5) Breadth frontal eminences
    (6) Length from meatus to anterior superior
    (7) Length from meatus to anterior superior plus breadth of frontal eminences

D. High development of the entire anterior region
    (8) Average breadth of forehead
    (9) Average length from meatus to anterior regions
    (10) Average breadth of forehead plus average length from meatus to anterior regions
    (11) Average breadth of forehead plus length meatus to anterior regions plus height of head
    (12) Ratio—Anterior length of head : posterior length of head—measured from meatus
    (13) Ratio—Anterior inferior length : posterior central length—measured from meatus
    (14) Ratio—anterior superior length : posterior central length—measured from meatus

E. Wide head
    (15) Maximum breadth of head
    (16) Cephalic index
    (17) Breadth divided by height index
    (18) Breadth divided by (height plus length) index

F. Great breadth between eyes
    (19) Eye to eye center

G. Arched nose
    (20) Average length from meatus to root and tip of nose subtracted from length meatus to bridge of nose

H. Small eyes
    (21) Eye opening vertical (inverse)
    (22) Breadth of eyes horizontal (inverse)
    (23) Vertical opening of eyes plus breadth (inverse)

TABLE 1—*Continued*

I. Broad blunt facial features
  (24) Average breadth of nose
  (25) Breadth of mouth
  (26) Breadth of chin
  (27) Breadth of nose plus breadth of mouth plus breadth of chin
J. Vertical forehead profile
  (28) Length meatus to anterior superior less length meatus to anterior inferior

TABLE 2

Outline of factors used in the study of trait intelligence

Hypotheses: That intelligence is indicated by the following physical factors:

A. Large cranial development
  Measured by:
  (1) Circumference—anterior inferior to posterior central
  (2) Circumference plus height of head from meatus vertical
  (3) Length of head—glabella to occipital protuberance plus height plus maximum breadth
B. Large ratio head development to body
  (4) Circumference—anterior inferior to posterior central divided by weight
  (5) Circumference plus height of head divided by weight
  (6) Height plus breadth plus length of head divided by weight
C. Wide forehead
  (7) Average width of forehead
D. Prominent anterior superior region
  (8) Breadth frontal eminences
  (9) Length from meatus to anterior superior
  (10) Length from meatus to anterior superior plus breadth of frontal eminences
E. Prominent anterior lateral region
  (11) Breadth of head at temples
F. High head
  (12) Height meatus to top of head
  (13) Height divided by length index
  (14) Height divided by breadth index
  (15) Height divided by (breadth plus length) index

TABLE 2—*Continued.*

G. Great length from ears forward
  (16) Meatus to anterior inferior
  (17) Ratio—average anterior length : average posterior length of head
  (18) Ratio—anterior inferior length : posterior central length—measured from meatus
H. Great breadth between eyes
  (19) Eye to eye center
I. Small eyes
  (20) Eye opening verticle (inverse)
  (21) Breadth of eyes horizontal (inverse)
  (22) Vertical opening of eyes plus breadth (inverse)
J. Large facial features
  (23) Average breadth of nose
  (24) Breadth of mouth
  (25) Breadth of chin
  (26) Length plus height of nose
  (27) Breadth of nose plus breadth of mouth plus breadth of chin
K. Long nose
  (28) Length of nose
L. Straight nose
  (29) Average length from meatus to root and tip of nose subtracted from length meatus to bridge of nose

TABLE 3

Reliability of ratings of close associates

Ratings of first half (10 close associates) taken in chance order correlated with ratings of second half (10 close associates) taken in chance order

TRAIT	GROUP W (10 CASES)	P.E.	GROUP X (9 CASES)	P.E.	GROUP Y (9 CASES)	P.E.	AVERAGE
Judgment	0.92	0.032	0.97	0.013	0.96	0.017	0.950
Intelligence	0.92	0.032	0.79	0.084	0.83	0.070	0.846
Frankness	0.33	0.190	0.68	0.120	0.79	0.084	0.600
Will Power	0.83	0.064	0.78	0.087	0.96	0.016	0.856
Ability to Make Friends	0.73	0.095	0.41	0.186	0.75	0.098	0.630
Leadership	0.78	0.084	0.87	0.054	0.83	0.070	0.826
Originality	0.81	0.072	0.71	0.111	0.80	0.081	0.773
Impulsiveness	0.61	0.133	0.93	0.030	0.78	0.087	0.773

ratings were obtained by correlating half of the judgments against the other half for the ratings of each trait. The self correlations are reported in table 3.

Groups W, X and Y are the three groups keyed for obvious reasons.

HALO IN RATINGS BY CLOSE ASSOCIATES

In order to determine the probable amount of halo effect in these analyzed ratings the inter-correlations between all the traits were computed. We do not know what the inter-correlations actually are. However if all the inter-correlations were 1.00 we would be certain that all that had been obtained was a

TABLE 4

Inter-correlation of trait judgment with the remaining seven traits

	GROUP W	P.E.	GROUP X	P.E.	GROUP Y	P.E.	AVERAGE
Intelligence	0.89	0.045	0.69	0.117	0.91	0.039	0.830
Frankness	0.71	0.106	0.58	0.148	0.93	0.030	0.740
Will Power	0.68	0.113	0.91	0.039	0.96	0.017	0.853
Ability to Make Friends	0.76	0.090	0.55	0.157	0.83	0.070	0.713
Leadership	0.91	0.034	0.98	0.008	0.91	0.039	0.933
Originality	0.69	0.111	0.50	0.169	0.59	0.146	0.593
Impulsiveness	−0.42	0.175	0.17	0.218	−0.22	0.215	−0.156

general estimate under many different names. Space will not permit the insertion here of all the tables of inter-correlations. One table (table 4) is inserted. This table is typical of all the others rendered by the close associates.

The distribution of all the inter-correlations of ratings of close associates is given in table 5.

We have then very reliable ratings of three groups. Each group was rated by men or women who live in the closest association with the subjects studied. *They* presumably know the subjects studied. Over-estimation was avoided by the man to man method of rating. The inter-correlation between traits are on the whole reasonable. The number of judges used in rating each group was twenty.

TABLE 5

Average inter-correlation of traits—ratings of close associates

A. Average inter-correlation 0.85 to 1.00
   1. Judgment and Will Power
   2. Judgment and Leadership
   3. Will Power and Leadership

B. Average inter-correlation 0.55 to 0.84
   1. Judgment and Intelligence
   2. Judgment and Frankness
   3. Judgment and Ability to Make Friends
   4. Judgment and Originality
   5. Intelligence and Frankness
   6. Intelligence and Will Power
   7. Intelligence and Ability to Make Friends
   8. Intelligence and Leadership
   9. Intelligence and Originality
   10. Frankness and Will Power
   11. Frankness and Ability to Make Friends
   12. Frankness and Leadership
   13. Frankness and Originality
   14. Will Power and Ability to Make Friends
   15. Leadership and Originality
   16. Leadership and Ability to Make Friends

C. Average inter-correlation 0.35 to 0.54
   1. Will Power and Originality
   2. Ability to Make Friends and Originality
   3. Originality and Impulsiveness

D. Average inter-correlation below 0.35
   1. Judgment and Impulsiveness
   2. Intelligence and Impulsiveness
   3. Frankness and Impulsiveness
   4. Will Power and Impulsiveness
   5. Ability to Make Friends and Impulsiveness
   6. Leadership and Impulsiveness

THE RELIABILITY OF RATINGS BY CASUAL OBSERVERS

Each of the three groups which were rated by their close associates and members of which were character analyzed were also rated by casual observers. The procedure was as follows: Each group in turn were seated upon a stage and seventy judges rated them for the eight traits used in this study. The casual observers were composed of business men, school superin-

tendents and students of personnel management. Most of the group were accustomed to judging men and women with possible employment in view. As far as could be learned none of these judges used any "system" of judgment consciously. Each group remained on the stage long enough for even the satisfaction of the most deliberate judge. The ratings thus obtained were divided into two groups and the self-correlation of the ratings obtained. These are our measure of the reliability of casual observation. Table 6 reports the correlations thus obtained.

TABLE 6

Reliability of ratings of casual observers

Ratings of first half (35 observers) taken in chance order correlated with ratings of second half (35 observers) taken in chance order

TRAIT	GROUP W (10 CASES)	P.E.	GROUP X (10 CASES)	P.E.	GROUP Y (10 CASES)	P.E.	AVERAGE
Judgment	0.88	0.048	0.98	0.008	0.92	0.019	0.926
Intelligence	0.91	0.034	0.96	0.016	0.90	0.041	0.923
Frankness	0.51	0.157	0.96	0.016	0.74	0.093	0.736
Will Power	0.99	0.004	0.96	0.016	0.95	0.021	0.966
Ability to Make Friends	0.87	0.050	0.90	0.041	0.89	0.045	0.886
Leadership	0.73	0.099	0.88	0.051	0.79	0.081	0.800
Originality	0.62	0.130	0.95	0.021	0.78	0.084	0.783
Impulsiveness	0.78	0.084	0.99	0.004	0.86	0.055	0.876

It is noteworthy that casual observation right or wrong is nevertheless fairly consistent. Whatever physical signs go to impress a casual observer seems similarly to impress other casual observers. The two traits that casual observers have the least agreement about are frankness and originality.

HALO IN RATINGS BY CASUAL OBSERVERS

It was also desirable to compute the inter-correlations between the several traits as judged by casual observers. Table 7 reports the inter-correlations between the trait judgment and the other traits. It is fairly typical of all the inter-correlations.

The summary of all the inter-correlations between traits as judged by casual observation is contained in table 8.

TABLE 7

Inter-correlation of trait judgment with the remaining seven traits

Ratings of casual observers

TRAIT	GROUP W (10 CASES)	P.E.	GROUP X (10 CASES)	P.E.	GROUP Y (10 CASES)	P.E.	AVERAGE
Intelligence	0.94	0.025	0.87	0.050	0.90	0.041	0.903
Frankness	0.25	0.199	0.73	0.099	0.38	0.182	0.453
Will Power	0.85	0.059	0.82	0.067	0.93	0.029	0.866
Ability to Make Friends	0.32	0.191	0.65	0.122	0.35	0.187	0.440
Leadership	0.64	0.125	0.83	0.069	0.62	0.130	0.696
Originality	0.86	0.055	0.16	0.208	0.87	0.050	0.630
Impulsiveness	0.32	0.191	−0.35	0.187	0.44	0.172	0.136

TABLE 8

Average inter-correlation of traits—ratings of casual observers

A. Average inter-correlation 0.85 to 1.00 (P.E. 0.059 to 0)
   1. Judgment and Intelligence
   2. Judgment and Will Power

B. Average inter-correlation 0.55 to 0.84 (P.E. 0.149 to 0.062)
   1. Judgment and Leadership
   2. Judgment and Originality
   3. Intelligence and Will Power
   4. Intelligence and Leadership
   5. Intelligence and Originality
   6. Will Power and Leadership
   7. Will Power and Originality
   8. Leadership and Originality

C. Average inter-correlation 0.35 to 0.54 (P.E. 0.220 to 0.188)
   1. Judgment and Frankness
   2. Judgment and Ability to Make Friends
   3. Intelligence and Ability to Make Friends
   4. Frankness and Intelligence
   5. Frankness and Ability to Make Friends
   6. Impulsiveness and Ability to Make Friends

D. Average inter-correlation 0.04 to 0.34 (P.E. 0.220 to 0.188)
   1. Judgment and Impulsiveness
   2. Intelligence and Impulsiveness
   3. Frankness and Will Power
   4. Frankness and Leadership
   5. Frankness and Originality
   6. Will Power and Ability to Make Friends
   7. Will Power and Impulsiveness
   8. Ability to Make Friends and Leadership
   9. Ability to Make Friends and Originality
   10. Leadership and Impulsiveness
   11. Originality and Impulsiveness
   12. Impulsiveness and Frankness

TABLE 9

Inter-correlations—physical factors—trait judgment

Spearman rank method—28 cases

FACTOR	A-2	A-3	C-7	D-12	E-15	E-18	G-20	H-23	I-27	J-28
A-2		0.86	0.37	0.48	0.32	−0.07	−0.50	−0.64	−0.65	−0.20
A-3	0.86		0.40	0.42	0.57	0.12	−0.29	−0.70	0.42	0.06
C-7	0.37	0.40		0.32	0.45	0.57	−0.09	−0.66	−0.19	0.02
D-12	0.48	0.42	0.32		0.71	0.53	0.08	−0.40	0.35	−0.20
E-15	0.32	0.57	0.45	0.71		0.67	0.08	−0.53	0.50	−0.48
E-18	−0.07	0.12	0.57	0.53	0.67		0.15	−0.44	0.06	−0.39
G-20	−0.50	−0.29	−0.09	0.08	0.08	0.15		0.26	−0.11	0.14
H-23	−0.64	−0.70	−0.66	−0.40	−0.53	−0.44	0.26		0.02	−0.06
I-27	−0.65	0.42	−0.19	0.35	0.50	0.06	−0.11	0.02		−0.56
J-28	−0.20	0.06	0.02	−0.20	−0.48	−0.39	0.14	−0.06	−0.56	
Mean.....	−0.003	0.215	0.132	0.255	0.255	0.122	−0.031	−0.350	−0.017	−0.185

TABLE 10

Mean inter-correlations 10 specific physical traits with 28 specific physical traits

Spearman rank method—28 cases

TRAIT	A-1	A-2	A-3	B-4	C-5	C-6	C-7	D-8	D-9	D-10	(21)
Mean inter-correlation with 28 traits.....	0.297	0.111	0.255	0.190	0.133	0.105	0.199	0.242	0.240	0.266	

lation with 28 traits.....	0.297	0.111	0.255	0.190	0.133	0.105	0.199	0.242	0.240	0.266

THE RELIABILITY OF MEASUREMENTS BY EXTERNAL SIGNS

It will be remembered that the reliability of judgments by close associates and even by casual observers using no particular "system" was high. It will be useful to know that the reliability of judgments based upon the "authoritative" physical measurements possess no such agreement. When a group is measured for those physical factors purported to reveal judgment we find that the measures do not agree among themselves. Table 9 shows the inter-correlations between ten physical factors supposed to measure the same trait. This is typical of the agreement between other physical measures purporting to measure the same trait.

No better agreement is found when we find the inter-correlations of the total 28 factors used in measuring Judgment, as table 10 shows.

CORRELATIONS BETWEEN RATINGS OF CLOSE ASSOCIATES AND PHYSICAL FACTORS

In correlating the measures of character gained from physical measurements with those obtained from the judgments of close associates two methods were used throughout this study. First the correlation between the two types of character estimate was computed for each of the three groups. Second the members of each group were thrown into one array as follows. Each rating was changed to a standard measure and thus the scores of all the groups become comparable. The formula for transferring ratings of any one group to scores for a total group was

$$\frac{\text{Score} - \text{true mean}}{\text{Standard deviation}} = \text{standard measure}$$

In this way 28 cases could be studied at once.

Further in view of the fact that the different factors purporting to measure any given character trait correlated so poorly with each other that it would be impossible to build up a *one best measure* of any trait we have correlated each separate physical

TABLE 11

Correlations existing between ratings of close associates and physical factors

Pearson product-moment method trait judgment

PHYSICAL FACTOR	STANDARD MEASURES (28 CASES)	P.E.	GROUP W (10 CASES)	P.E.	GROUP X (9 CASES)	P.E.	GROUP Y (9 CASES)	P.E.
A-1	−0.04	0.127	0.32	0.191	−0.24	0.213	−0.38	0.192
A-2	−0.10	0.126	0.53	0.153	−0.21	0.216	−0.31	0.203
A-3	−0.12	0.125	0.06	0.217	−0.29	0.206	−0.34	0.198
B-4	0.21	0.121	0.02	0.221	0.23	0.214	0.52	0.164
C-5	−0.06	0.127	−0.32	0.191	−0.02	0.225	0.02	0.225
C-6	−0.04	0.127	0.34	0.188	0.22	0.215	0.26	0.210
C-7	0.08	0.126	−0.39	0.180	−0.13	0.220	0.32	0.201
D-8		0.127	−0.06	0.217	0.04	0.224	0.23	0.214
D-9	0.06	0.127	0.55	0.149	−0.27	0.209	0.37	0.193
D-10	0.05	0.127	0.04	0.220	−0.08	0.223	0.63	0.135
D-11	−0.04	0.127	0.03	0.221	−0.28	0.207	0.01	0.225
D-12	0.29	0.116	0.38	0.182	0.23	0.214	0.69	0.117
D-13	0.38	0.108	0.52	0.155	−0.03	0.224	0.74	0.101
D-14	0.31	0.115	0.36	0.185	0.33	0.200	0.65	0.129
E-15	0.09	0.126	0.15	0.209	−0.10	0.222	−0.21	0.216
E-16	−0.09	0.126	−0.18	0.207	−0.04	0.224	−0.32	0.201
E-17	0.00	0.127	−0.59	0.139	0.29	0.206	0.34	0.198
E-18	−0.01	0.127	−0.29	0.195	0.23	0.214	0.20	0.216
F-19	−0.14	0.125	0.23	0.202	−0.53	0.161	−0.21	0.216
G-20	0.03	0.127	0.16	0.208	0.02	0.225	0.08	0.223
H-21	0.06	0.127	0.37	0.183	0.14	0.220	0.02	0.225
H-22	−0.07	0.127	0.00	0.222	−0.30	0.204	−0.33	0.200
H-23	−0.04	0.127	0.15	0.209	−0.22	0.215	0.04	0.224
I-24	−0.27	0.118	−0.18	0.207	−0.22	0.215	0.43	0.182
I-25	−0.34	0.112	0.09	0.213	−0.57	0.151	−0.46	0.177
I-26	−0.07	0.127	0.54	0.151	−0.58	0.148	0.04	0.224
I-27	−0.12	0.125	0.32	0.191	−0.78	0.087	−0.04	0.224
J-28	−0.20	0.122	−0.18	0.207	0.33	0.200	−0.22	0.215
Average...	−0.005							

measurement with the ratings by close associates. Since many physical measures might be false yet some *might* be true. It will be too prodigal of space to report all of these correlations

for every trait studied. Table 11 is a full report of the correlations for one character trait. In further instances averages alone will be reported.

AVERAGE CORRELATIONS BETWEEN RATINGS BY CLOSE ASSOCIATES AND PHYSICAL FACTORS FOR EIGHT TRAITS

It is unnecessary to report all the correlations between the ratings by close associates for a given trait and the many physical factors purporting to reveal that given trait. Table 12 reports the average correlation between ratings and the physical factors.

TABLE 12

Average correlations—physical factors and close associates; physical factors and casual observers

TRAIT	CLOSE ASSOCIATES AND PHYSICAL FACTORS	CASUAL OBSERVERS AND PHYSICAL FACTORS
Judgment	−0.005	+0.145
Intelligence	+0.027	+0.051
Frankness	+0.055	+0.155
Friendliness	−0.11	+0.195
Will Power	−0.074	+0.036
Leadership	−0.041	+0.066
Originality	+0.095	+0.079
Impulsiveness	+0.100	−0.067

The number of different physical factors used varied from 36 for Will Power to 13 for Ability to Make Friends.

THE AGREEMENT BETWEEN CLOSE AND CASUAL OBSERVERS

Table 13 gives correlations between close and casual observers.

CONCLUSION

While the correlations secured between the ratings of close associates and casual observers show a general positive tendency they are not of sufficient magnitude to warrant any importance being attached to them. The highest correlation secured is less than four times its probable error.

The highest average correlation presented is 0.323. Such a correlation measured on the basis of the standard error of estimate formula:

$$\text{Sigma} = 1 \times \sqrt{1 - r2}$$

would have a value of 5.6 per cent better than chance. The highest single correlation secured was 0.58. Such is 18.6 per cent better than chance.

TABLE 13

Correlation existing between ratings of close associates and ratings of casual observers

TRAIT	GROUP W (10 CASES)	P.E.	GROUP X (9 CASES)	P.E.	GROUP Y (9 CASES)	P.E.	AVERAGE
Judgment	0.29	0.195	0.48	0.172	0.18	0.217	0.316
Intelligence	0.04	0.220	0.26	0.210	−0.23	0.214	0.023
Frankness	0.11	0.211	0.31	0.203	0.21	0.216	0.210
Will Power	0.02	0.221	0.58	0.148	0.19	0.217	0.263
Ability to Make Friends	0.53	0.153	0.31	0.203	−0.30	0.204	0.180
Leadership	0.40	0.179	0.08	0.223	0.46	0.177	0.313
Originality	0.43	0.174	0.47	0.175	0.07	0.223	0.323
Impulsiveness	0.33	0.189	0.37	0.193	−0.10	0.222	0.200

SUMMARY OF STUDY

This study was undertaken to supply statistical basis for the truth or falsity of the theory and practice of character analysis. Theoretical refutation already exists in ample amount. From the facts reported and treated in this study the following conclusions receive clear support.

1. The ratings of close associates are reliable.
2. The ratings of 70 casual observers are reliable.
3. The physical factors purporting to measure the same trait do not present even a suspicion of agreement.
4. The correlation between ratings of close associates and casual observers is slightly better than chance.
5. The correlation between ratings of casual observers and physical measurements is best represented by 0.000.

6. The correlation between close associates and physical measurements is best represented by 0.000.

7. Physical measurements which underly character analysis agree neither with themselves nor with other measures of character.

ADVERTISING APPEALS SELECTED BY THE METHOD OF DIRECT IMPRESSION[1]

RICHARD B. FRANKEN

New York University

The "Order of Merit" method as used in ranking advertisements has so often been discussed by Hollingworth,[2] Strong,[3] Starch,[4] and others that a mere mention of it here should suffice. In the majority of cases where these authors have made use of this ranking method the number of advertisements have been limited to twenty or less; even when twenty advertisements were used it was thought so difficult to get a true order of merit directly that the subjects making the ranking were instructed first to separate the advertisements into groups, such as Very strong, Strong, Weak, Very weak, or otherwise, to facilitate ranking. The greater the number of advertisements the more difficult ranking them becomes, even with the help of separating them into groups. If one had, for example, about 1700 proposed drug signs 16 inches square to rank,—as was the case when Professor Woodworth and the writer tried to select a suitable sign for the Rexall Drug Company,—the task would become quite impossible. Thus some other method must necessarily be used if one has a great number of advertisements or other material upon which he desires to have scientific judgment passed.

[1] The writer wishes to express his thanks and appreciation to Prof. Harry D. Kitson, University of Indiana, and his students for their kind coöperation, without which this paper would not have been possible.

[2] Harry L. Hollingworth, Advertising and selling, Chapter I.

[3] Edward K. Strong, Jr., The relative merit of advertisements, Archives of Psychology, no. 17, July, 1911.

[4] Daniel Starch, Advertising, Chapter XXII.

The prime purpose of this article is to illustrate and discuss a method: the "Method of Direct Impression"—which has been used by Galton[5] in measuring mental imagery; by Titchener[6] in studying the affective qualities of a series of colors; by Strong[7] in securing degrees of confidence in recognition of a series of advertisements; etc.—and to show how this method may be applied to selecting the best advertisements or sales appeals from among *any* number of potential appeals.

For the purpose in hand a number of hosiery advertisements were selected from some of the leading national magazines. Although in many cases such pictorial presentation as "beauty" in hosiery predominated the advertisement, only the printed copy of these advertisements was carefully analyzed, and 77 somewhat overlapping, selling points or phrases, such as "Silk stockings that wear," "Value for the price," etc., were mimeographed on sheets of paper and distributed to four groups of students (160 men and 75 women) taking a course in Psychology of Advertising at New York University Summer School (1922) and at the University of Indiana (1922). The students were directed to rate the sales points as follows: 0, very weak; 1, weak; 2, strong; 3, very strong. The mimeographed sheets containing the instructions and the 77 sales appeals are reproduced herewith.

Each statement represents a possible selling point or advertising appeal for hosiery. Please mark all of these according to the degree in which they *appeal to you personally, persuade you,* or *interest you* in the product, as follows:

Mark very strong—3	Sex.....
Mark strong—2	Name.....
Mark weak—1	Class.....
Mark very weak—0	Date.....

[5] Francis Galton, Inquiries into human faculty and its development, pp. 57 to 77.

[6] Edward B. Titchenor, Experimental psychology, vol. I, pp. 154–8.

[7] Edward K. Strong, Jr., The Psychological Review, vol. XIX, no. 6, November, 1912.

ANALYSIS OF ARGUMENTS FOR HOSIERY

1. The best of service.
2. Made of tested combed yarn.
3. Specially dyed.
4. Finished to retain the yarn in its greatest natural strength.
5. Reinforced heels and toes.
6. Specially constructed to guarantee long wear.
7. Maintain original high quality.
8. Don't speculate with the money you invest in silk stockings.
9. There is a certain satisfying value.
10. They're garter proof. "No run that starts above can pass the gold stripe."
11. Silk stockings that wear.
12. Good as they look.
13. You get what you pay for.
14. Washing won't hurt them (don't get a cheap silk—it goes in the first wash).
15. Be sure you get fresh stock when buying silk hose (new shipments just arrived in all desirable colors).
16. All the qualifications of a guaranteed hose at half the price.
17. Quality first.
18. Don't wear out as quickly.
19. Value for the price.
20. Long staple yarn.
21. Single sole with triple heel and toe.
22. Prolong the life by changing daily or oftener for summer. Change your socks and your *shoes*—it's a very restful thing to do.
23. Full fashion fits shape of the foot.
24. Do not hang baggy.
25. No seam to chafe or rub the skin.
26. Snug fit prevents chaffing the feet.
27. Fit like a glove.
28. Tested for strength.
29. Strong threads.
30. Absolute fast colors guaranteed (new pair or your money back).
31. Guaranteed 6 months.
32. Guaranteed to give satisfaction.
33. Wear well.
34. Fit well.
35. Stylish.
36. Pure silk.
37. Fast colors.
38. Fast colors guaranteed.
39. Double heel and toe.

40. Seamless.
41. More stitches per inch.
42. Closer knit (or woven).
43. Reinforced where the wear comes.
44. Best for 50 years.
45. Made in daylight plant.
46. Every pair will fit and wear satisfactorily.
47. Snug fit at the ankle.
48. The sheer beauty of ————.
49. *Wears* as well as it *looks*.
50. In many weights and shades.
51. Pure thread silk
52. The first socks in America to be knitted by machinery were made at ———— in 1822.
53. 97 years ago.
54. More than 50,000,000 pairs of ———— that gave satisfaction last year.
55. Doing one thing well for almost a century.
56. Satisfying the needs of human feet.
57. Oldest and one of the largest hosiery mills in the United States.
58. Why have holes in your hosiery?
59. Reinforced hosiery for men, women, and children.
60. Makes a sensible gift for men or women.
61. It furnishes the kind of service that justifies the purchase.
62. Dependable wear and snug clean-cut appearance.
63. Hosiery satisfaction.
64. There's real comfort for tired or tender feet in ———— fashioned hose.
65. The method of knitting these stockings is different.
66. Patent machines that "knit in" the proper shape and fit, without seams.
67. No homely stitching up the back of the leg.
68. No seams to walk on.
69. Just a soft smoothness that gives real comfort.
70. The fit is snug and firm everywhere.
71. There's no room for wrinkles in ———— hose.
72. Extra elastic, narrow tip, prevents garter runs.
73. Style, quality and sound value.
74. Fascinating new designs in ———— silk hosiery for summer are certain to delight you.
75. Hosiery—each the best of its kind.
76. Home knit for our soldiers.
77. For those whose needs demand the essential combination of style, quality and sound value.

TABLE 1

A tabulation of the rankings of 77 hosiery appeals by 160 males and 75 females, listed according to the strength of the appeals as indicated by the results of the study

APPEAL KEY NUMBER	RATINGS				TOTAL SCORE*	AVERAGE	AVERAGE FINAL RANK		THE SALES APPEAL
	0	1	2	3			Males	Females	
5	1	6	55	98	410	2.56	1		Reinforced heels and toes
	0	4	25	46	189	2.51		1	
31	18	14	32	86	346	2.16	2		Guaranteed six months
	6	17	16	36	157	2.09		10	
21	12	26	47	65	335	2.08	3		Single sole with triple heel and toe
	3	13	26	33	164	2.19		6.5	
39	5	27	79	70	334	2.08	4		Double heel and toe
	5	2	39	28	164	2.19		6.5	
43	7	26	78	49	309	1.93	5		Reinforced where the wear comes
	3	6	27	39	177	2.36		4	
6	10	42	62	46	303	1.88	6		Specially constructed to guarantee long wear
	2	14	31	28	160	2.13		8	
17	14	40	64	42	294	1.83	7		Quality first
	6	14	25	30	154	2.05		12	
38	24	26	61	49	293	1.81	8		Fast colors guaranteed
	6	8	16	45	176	2.34		5	
36	21	42	60	37	273	1.71	9		Pure silk
	8	9	29	29	154	2.05		12	
32	27	41	57	35	260	1.62	10		Guaranteed to give satisfaction
	5	14	28	28	154	2.06		12	

* The total score, column 6, is figured as follows: For example, appeal no. 5 which ranked first by the males and females was rated 1 by 6 males 2 by 55; and 3 by 98; so that $1 \times 6 = 6 + 2 \times 55 = 110 + 3 \times 98 = 294 = 6 + 110 + 294 = 410$; etc. $410 \div 160$ (the number of cases) = 2.56 (column 7), average score given to the appeal by males.

TABLE 1—*Continued*

APPEAL KEY NUMBER	RATINGS				TOTAL SCORE*	AVERAGE	AVERAGE FINAL RANK		THE SALES APPEAL
	0	1	2	3			Males	Females	
40	25	40	67	28	258	1.61	11.5		Seamless
	37	19	12	7	64	0.85		67.5	
27	23	45	63	29	258	1.60	11.5		Fit like a glove
	6	21	31	17	134	1.78		20	
28	15	53	66	24	257	1.59	13		Tested for strength
	8	18	35	14	130	1.73		22.5	
1	35	36	51	38	252	1.58	14		The best of service
	5	22	26	22	140	1.86		19	
72	34	49	64	23	246	1.53	15		Extra elastic, narrow tip, prevents garter runs
	6	7	31	30	159	2.12		9	
30	12	24	54	70	242	1.51	16		Absolute fast colors guaranteed (new pair or your money back)
	3	7	16	48	133	2.44		2	
62	23	63	65	19	240	1.50	17		Dependable wear and snug clean-cut appearance
	12	14	31	17	127	1.69		25.5	
73	29	55	46	30	237	1.48	18		Style, quality and sound value
	8	11	22	33	146	1.95		16	
47	29	59	62	21	236	1.47	19		Snug fit at the ankle
	6	27	26	16	127	1.69		25.5	
29	19	71	50	21	234	1.46	20		Strong threads
	19	22	22	12	102	1.36		41	
14	29	56	49	26	232	1.45	21		Washing won't hurt them (don't get a cheap silk—it goes in the first wash)
	12	29	22	12	109	1.45		34	
51	25	48	68	29	230	1.45	22		Pure thread silk
	6	14	29	26	150	2.00		14.5	

TABLE 1—*Continued*

APPEAL KEY NUMBER	RATINGS				TOTAL SCORE*	AVERAGE	AVERAGE FINAL RANK		THE SALES APPEAL
	0	1	2	3			Males	Females	
37	28	50	68	14	228	1.42	25		Fast colors
	7	11	40	17	142	1.91		18	
59	21	64	61	14	228	1.42	25		Reinforced hosiery for men, women and children
	6	23	31	15	130	1.73		22.5	
68	29	58	49	24	228	1.42	25		No seams to walk on
	23	20	12	19	101	1.34		44	
69	28	42	61	16	228	1.42	25		Just a soft smoothness that gives real comfort
	12	20	38	5	111	1.48		33	
10	46	37	40	37	228	1.42	25		They're garter proof. "No run that starts above can pass the gold stripe"[1]
	3	10	15	49	181	2.42		3	
35	21	65	44	26	226	1.41	28		Stylish
	22	18	18	16	102	1.36		41	
2	25	67	47	21	224	1.40	29.5		Made of tested combed yarns
	19	35	16	5	82	1.09		57	
54	30	46	64	20	224	1.40	29.5		More than 50,000,000 pairs of ——— that gave satisfaction last year
	21	23	21	10	95	1.27		49	
60	22	64	63	11	223	1.39	31		Makes a sensible gift for men and women
	10	23	31	11	118	1.57		30.5	
25	39	45	52	24	221	1.38	32		No seam to chafe or rub the skin
	27	19	13	16	93	1.24		51	
77	30	42	70	17	219	1.37	33		For those whose needs demand the essential combination of style, quality, and sound value
	7	10	29	28	150	2.06		14.5	
70	26	63	59	12	217	1.35	34		The fit is snug and firm everywhere
	9	26	27	12	116	1.54		32	

TABLE 1—*Continued*

APPEAL KEY NUMBER	RATINGS 0	1	2	3	TOTAL SCORE*	AVERAGE	AVERAGE FINAL RANK Males	Females	THE SALES APPEAL
7	28	63	54	15	216	1.35	35		Maintain original high quality
	18	29	23	5	90	1.20		54	
23	30	60	58	12	215	1.34	36.5		Full fashion fits shape of the foot
	4	20	29	22	144	1.92		17	
24	52	44	51	23	215	1.34	36.5		Do not hang baggy
	27	16	25	7	100	1.33		46.5	
26	32	60	50	18	214	1.34	38.5		Snug fit prevents chafing the feet
	15	23	27	10	107	1.43		36	
33	32	55	60	14	214	1.34	38.5		Wear well
	9	24	24	18	126	1.68		27	
11	38	53	55	14	205	1.28	40.5		Silk stockings that wear
	6	28	29	12	120	1.60		29	
12	37	52	40	21	205	1.28	40.5		Good as they look
	12	32	21	10	104	1.38		38	
34	27	68	56	9	207	1.27	42		Fit well
	12	31	21	10	103	1.37		39	
4	29	67	53	11	202	1.27	43		Finished to retain the yarn in its greatest natural strength
	19	28	18	9	91	1.21		53	
19	37	58	52	13	201	1.25	44		Value for the price
	7	37	28	3	102	1.36		41	
18	31	65	57	7	200	1.25	45.5		Don't wear out quickly
	20	23	25	7	94	1.25		50	
71	37	49	51	13	200	1.25	45.5		There's no room for wrinkles in ——— hose
	19	15	27	12	105	1.39		37	

TABLE 1—*Continued*

APPEAL KEY NUMBER	RATINGS				TOTAL SCORE*	AVERAGE	AVERAGE FINAL RANK		THE SALES APPEAL
	0	1	2	3			Males	Females	
64	38	67	40	16	195	1.22	47		There's real comfort for tired or tender feet in ———— fashioned hose
	10	23	26	16	123	1.64		28	
49	40	52	42	16	194	1.21	48		*Wears* as well as it *looks.*
	17	17	22	19	118	1.57		30.5	
22	53	49	32	26	191	1.20	49		Prolong the life by changing daily or oftener for summer. Change your socks and your shoes—it's a very restful thing to do
	31	20	17	7	75	1.00		60	
16	30	76	39	6	190	1.19	50		All the qualifications of a guaranteed hose at half the price
	17	27	19	11	98	1 30		48	
42	48	49	53	10	188	1.17	51		Closer knit (or woven)
	30	23	18	4	71	0.95		63	
20	39	67	40	13	187	1.17	52.5		Long staple yarn
	43	23	8	1	42	0.56		72	
55	46	54	47	13	187	1.16	52.5		Doing one thing well for almost a century
	27	30	11	7	73	0.97		61	
61	35	72	47	6	184	1.15	54		It furnishes the kind of service and justifies the purchase
	13	24	30	8	108	1.44		35	
57	46	55	49	10	183	1.15	55		Oldest and one of the largest hosiery mills in the United States
	27	27	16	4	71	0.95		63	
3	39	67	42	13	181	1.15	56		Specially dyed
	10	34	26	5	101	1.35		44	
63	47	52	54	7	179	1.12	57		Hosiery satisfaction
	12	29	25	9	131	1.75		21	

TABLE 1—*Continued*

APPEAL KEY NUMBER	RATINGS 0	1	2	3	TOTAL SCORE*	AVERAGE	AVERAGE FINAL RANK Males	Females	THE SALES APPEAL
67	47	64	35	14	176	1.10	58		No homely stitching up the back of the leg
	30	18	22	5	65	0.87		66	
46	38	72	39	11	173	1.08	59		Every pair will fit and wear satisfactorily
	14	27	28	6	101	1.35		44	
74	45	66	41	8	172	1.08	60		Fascinating new designs in ——— silk hosiery for summer are certain to delight you
	12	12	33	17	129	1.72		24	
50	44	73	38	5	164	1.02	61.5		In many weights and shades
	22	17	25	11	100	1.33		46.5	
56	55	60	31	14	164	1.02	61.5		Satisfying the needs of human feet
	15	33	22	5	92	1.22		52	
58	55	50	32	13	163	1.01	63		Why have holes in your hosiery?
	28	19	21	7	82	1.09		58	
15	60	55	36	9	154	0.96	64		Be sure you get fresh stock when buying silk hose (new shipments just arrived in all desirable colors)
	17	29	24	4	89	1.19		55	
13	65	68	26	11	153	0.95	65		You get what you pay for
	23	27	16	9	86	1.15		56	
44	65	48	38	9	151	0.94	66		Best for 50 years
	35	20	16	4	64	0.85		67.5	
41	69	51	32	10	145	0.91	67.5		More stitches per inch
	53	12	7	3	35	0.47		74	
75	60	72	21	7	145	0.91	67.5		Hosiery—each the best of its kind
	21	32	19	2	76	1.01		59	

TABLE 1—*Concluded*

APPEAL KEY NUMBER	RATINGS				TOTAL SCORE*	AVERAGE	AVERAGE FINAL RANK		THE SALES APPEAL
	0	1	2	3			Males	Females	
66	75	61	30	4	133	0.83	69		Patent machines that "knit in" the
	34	25	17	0	59	0.79		69	proper shape and fit, without seams
48	74	52	27	7	127	0.79	70		The sheer beauty of ———
	33	24	10	8	68	0.90		65	
76	77	49	26	8	125	0.78	71		Home knit for our soldiers
	48	16	8	1	35	0.47		74	
8	78	57	18	7	114	0.71	72		Don't speculate with the money you
	40	27	5	3	46	0.91		71	invest in silk stockings
9	80	54	22	4	113	0.71	73		There is a certain satisfying value
	28	26	18	3	71	0.95		63	
52	91	34	28	37	111	0.69	74		The first stockings in America to be
	52	14	6	3	35	0.47		74	knitted by machinery were made at ——— in 1822
53	95	32	26	7	105	0.65	75		97 years ago
	57	8	4	5	31	0.41		77	
45	92	46	28	4	94	0.59	76		Made in daylight plant
	41	21	6	7	54	0.72		70	
65	78	67	15	1	93	0.58	77		The method of knitting these stock-
	48	21	2	3	34	0.45		76	ings is different

The results of this study are given in table 1. Column 1 of this table gives the key number of each sales appeal, indicating the position of its appearance on the original mimeographed sheet; columns 2, 3, 4, and 5 show the number of times each appeal was rated 0, 1, 2, and 3, for the males and females separately; column 6 gives the total score for each appeal; column

7 the arithmetic average; columns 8 and 9 the final rank for males and females; and column 10 the sales appeal. Thus the sales point, "Reinforced heels and toes," ranked first by both males and females; the sales appeal, "Guaranteed six months," ranked second by the males and tenth by the females; etc. The correlation between the final rank for the males and females $\left(\text{Spearman Footrule } r = 1 - \frac{6\Sigma d^2}{n\,(n^2-1)}\right)$ is + 0.81 and the correlation between two groups of 60 males is + 0.82; thus the results may be considered fairly reliable for the groups among which the study was conducted.

Since the results of this study are primarily given to illustrate the method as applied to advertising their practical value to the advertising copywriter may be questioned due to the inevitable factors that necessarily accompany the conditions under which the study was made. Chief among the objections are, that only the college-student consumer was studied; the difference between the artificial atmosphere under which the study was conducted and the conditions under which actual purchases are made; student reactions are not a perfect index of the general buyer's attitude; etc. Nevertheless, the following deductions that may be of some use to the practical man are pointed out.

The selling points vary widely in strength, the strongest appeal for males receiving an average score of 2.56, the weakest an average of 0.58; and for females the strongest average score is 2.51, the weakest 0.41. The appeals that show the greatest sex differences are numbers 40, 63, 74, and 10. These appeals, together with their final rank by each sex are listed as follows:

SALES APPEAL	THE APPEAL	RANK FOR MALES	RANK FOR FEMALES
40	Seamless	11.5	67.5
63	Hosiery satisfaction	57	21
74	Fascinating new designs in ——— silk hosiery for the summer are certain to delight you	60	24
10	They're garter-proof. "No run that starts above can pass the gold stripe"	25	3

Of the four appeals, nos. 63, 74, and 10, that are ranked much higher by the females than by the males, the first two are vague, while the third is primarily a feminine appeal, and although appeal no. 40, "Seamless," is also primarily a feminine appeal it is nevertheless not effective in influencing women to buy seamless hosiery. This statement is attested to by the fact that at least one manufacturer of seamless hosiery sews a thread up the back of his product to give them a seam-like appearance.

In an effort to see whether brevity played a noteworthy part in making an appeal strong or weak, the appeals were measured as to length. The average number of words in the ten strongest appeals for males is 4.0; for females 6.2; and the average number of words in the ten weakest appeals for males is 7.6; for females 6.5. Thus it may be noted that the strongest appeals on the average contain fewer words than the weaker ones; but while brevity may be a desirable factor in making appeals effective, it is not the most powerful factor in making for strength of an appeal; what really counts is the content of the appeal itself. A comparison of the content of the stronger appeals with the content of the weaker appeals reveals the fact that the main ideas embodied within the strongest appeals are durability, beauty, neatness, comfort; whereas there is no particular content in the weak appeals. They contain vague, irrelevant, non-personal statements which offer uncertain advantages to prospective customers.

As to the validity of the results of this study only the high degree of correlation between the groups tested is offered; and in answer to the question as to whether the "Method of Direct Impression" may be used to supplant or antedate the "Order of Merit Method" only subsequent studies, wherein the results obtained by the two methods may be compared, will tell. In one unpublished study, known to the writer, made by Prof. Albert T. Poffenberger of Columbia University, using seventy photographs, where the results of the two methods were compared the correlation was found to be almost perfect. Professor Poffenberger and the writer also have some additional statistical data, not yet worked up, which may throw some light on this question.

AN EXPERIMENTAL STUDY OF THE VOCATIONAL INTERESTS OF A LIBERAL ARTS COLLEGE GROUP[1]

KATHRYN McHALE

Assistant Professor of Education, Goucher College

It is very apparent that the vocational guidance movement has outstripped adequate preparation for it. In many instances, regardless of where we see attempts at meeting the problem, we find great differences in the technique employed to discover vocational fitness. For the most part however, it is being done along subjective lines. The individual is given authoritative information which is not only a description of occupations, but also an account of what the worker in them has to do and know; in addition, to increase the thoroughness of guidance various other data are used such as, judgments as to the individual's fitness, academic marks (in a few cases, intelligence tests scores), achievement in extra-curricular activities, and other things of like character. Naturally, there are variations of this procedure, and a few exceptions. The most admirable exceptions are found in the attempts made by Professor Husband of Dartmouth, and Professor Thurstone of the Carnegie Institute of Technology, to raise vocational guidance to a scientific or objective plane.

The reason why there is so little scientific guidance is obvious —we need many more objective measures of vocational fitness; tests whose validity and reliability are sufficiently established for diagnosing and for predicting relative degrees of success in many occupations and absolute success in one, if other things

[1] The writer wishes to extend appreciation to Drs. E. L. Thorndike, R. Pintner, and A. L. Rogers for timely suggestions in the construction of the tests.

are equal. This naturally will entail concentrated effort for a number of years, not only in the actual making and standardization of tests, but in a very detailed analytical study of what actual vocational success depends upon. We can say in general, that occupational fitness depends primarily on bodily, intellectual, and temperamental traits. We have many valid and reliable measures of the first two, but traits of either, however accurately measured alone, are inadequate for giving a complete picture of an individual. We find very few measures of temperamental traits, so that to appraise the value of an individual without trustworthy measure of his reliability, his honesty, his courage or his self-dependence would be unpardonably stupid. Dr. Watson (1) says we need something even more than this, namely, that we need to keep for vocational guidance purposes, scientific records of individuals from the one hundred and fiftieth day of their lives on.

> What objects they select day by day, what form their manipulation takes, and what early habits develop upon such primitive instinctive activity should be recorded day by day in black and white. There will be marked individual differences in the material selected, in the length of time any type of material will be utilized, and in the early habits which will arise . . . . but until we have followed up the future course of such . . . . we are in no position to make generalizations about the original tendencies which underlie the vocations.

Another possible determining factor which has been scarcely utilized for vocational guidance is the interests of individuals. Vocational guidance directors have sought to tap interests, to be sure, but few have determined accurately the degree to which any interest is possessed; they have not, to any degree of satisfaction, been able to tap accurately the interests of those who are not conscious, in the sense of full awareness, of a vocational interest. If we possessed full knowledge of the degree of existing interests we could then turn to [redacted] intelligent study of the individual's abilities as rela[redacted] vocational interests. We have sufficient evidence to [redacted]ve that if any individual pursues an activity in which he is wholeheartedly interested, he will put forth his greatest effort, which insures

success within his limits. The evidence can be found in a review of a few scientific studies of interests (2). The most convincing among them is that of E. L. Thorndike (3). In his elaboration of the Bridge's (4) data he found the following:

> The order of a pupil's interests as he estimates them gives almost as good a prophecy of the order of his abilities as he estimates them. Neither gives a very close prophecy because the distinctions involved are so fine—and because the grade received in a single course is so afflicted with chance error. Widen the distinction (as by comparing mathematics, language, physical sciences, history, drawing and music) and reduce the chance error (as by taking the average in four or more courses in each) and the correlation between interest and ability will surely rise considerably above 0.70. On the whole Bridge's data seem to corroborate the doctrine of a very close relation between the order of an individual's interests and the order of his abilities.

These suggestions along with others influenced the writer to formulate a working idea to guide an objective study of vocational interests in Goucher College; the idea being, that if one made an information test based on interests, perhaps one would arrive at something more tangible by way of a guidance tool. The following sources served, for the most part, to furnish the vocabulary and test content: (*a*) information from books suggested by Frederick Allen (5), (*b*) information gathered by Elizabeth Kemper Adams (6) and (*c*) tabulated magazine and newspaper clippings read by Goucher students in incidental or casual reading for a period of three months. Several hundred tests of the recognition type, made up principally from these sources were criticized by judges who left 247 as being the most representative. On the cover page of the test appeared a suggested list of vocations for college women (6) with two directions to the student, (*a*) to underline five of her choices in order of preference, (*b*) to read the test directions and proceed when the signal was given. This test was given to 133 Goucher Juniors in J[redacted]922, and finished in fifty minutes by the quickest and in eighty minutes by the slowest. Samples of the test follow with directions.

Underline the word or words which will make the statement accurate.

Group I

The most widely used individual general intelligence test in the elementary schools is the

Pintner-Patterson Performance Tests Seguin Form Board Stanford Binet-Simon Army Alpha

The Education Bill would if passed

Abolish State's Rights Provide for government inspection of schools Allow for school standardization Establish a National Department of Education with a Secretary in the President's cabinet.

Group II

Root vegetables are best kept by

Cutting tops Removing dirt Keeping dirt and tops attached. Placing in water

The best depth of pan which will keep milk sweet longest is one which is

3 5 7 9 (inches)

Tripe is a

Fish Animal membrane Fowl Vegetable

In reading an electric meter the dial on the right in a complete revolution indicates in kilowatt hours

10 100 1,000 10,000

A butler or waitress should start to serve

Left of person at hostess's left Left of person at hostess's right Farthest person from the hostess Nearest person to the pantry

Group II

The "Findex System" is used in

Book-keeping Stenography Filing Typewriting

A comptometrist is secured to use principally a

Typewriter Dictating machine Telephone Computing machine

Group V

The "Hippocratic Oath" is taken by college graduates with an

M.D. Ph.D. A.B. Ll.B.

The capacity of an empty stomach is

0 1 2 3 (ounces)

Group VI

A codicil is

An attachment A bill A supplement to a will A wish

The greatest of our Chief Justices was

Wm. White Wm. Taft John Marshall James Kent

In January, 1924, a questionnaire was sent to each person and at the same time a "follow-up letter" to the employer. The results follow, but like so many other bits of psychological work they must be looked upon merely as a preliminary exposition of possibilities rather than as usable results.

RESULTS

I. Choice, consistency and influence of parental occupation

a. The suggested vocations for women college graduates are shown in table 1, along with the popularity of the first and second choices according to this group's selection. (The tests attempted to cover, in part at least, the same general vocational groups, with the exception of groups IV, VII, and VIII which were added by those who wished to vary from the suggested list.)

b. Only 0.4 per cent of the group seemed to be influenced in choice by their fathers' vocational pursuit, and according to the 1924 questionnaire only 0.15 per cent pursued the same. Only 0.3 per cent seemed to be influenced in making a second choice by their fathers' vocation, and only 0.08 per cent pursued the same. If we consider this result then, one might be able to say that the father's vocational pursuit has little, if any, influence in determining a *woman's* vocational choice. If we consider the influence of the mother's vocational pursuit as related to choice we find Homemaking to be the second largest group represented and, in a sense, quite closely related to the first choice group, that is, Educational and Social Service. One might then state that the native tendency in the case of women is a most potent determiner of vocational choice, disregarding, of course, other possible factors such as, the reluctance to accept directly the pursuit of a career with money earning responsibilities, desire for a certain amount of leisure or independence, etc.

c. The degree of stability or change of choice was revealed in the 1924 questionnaire when 24.8 per cent changed their first choice and 40.6 per cent changed their second choice. This perhaps reveals some truth in the traditional saying, "It is a

TABLE 1

SUGGESTED LIST OF VOCATIONS	FIRST CHOICE IN TOTAL PER CENT	SECOND CHOICE IN TOTAL PER CENT
*Group I (Educational and Social Service)**	41.3	60.0
1. Community Service		
2. Library and Museum Work		
3. Boy's and Girl's Work		
4. Vocational Guidance		
5. Educational Research		
6. Teaching		
7. Rural Work		
8. Protective Work		
9. Child Welfare		
10. Family Case Work		
11. Recreation		
12. Dramatics		
13. Interpreting and Translating		
14. Physical Education and Hygiene Teaching		
*Group II (Homemaking, etc.)**	27.0	15.0
1. Homemaking (Home Economics, Household Arts, etc.)		
2. Dietetics and Food		
3. Interior Decorating		
4. Institutional Management		
5. Costume Design		
*Group III (Business)**	17.2	12.0
1. Civic and Government Service		
2. Personnel Management		
3. Professional Secretarial Work		
4. General Secretarial Work		
5. Salesmanship		
6. Advertising and Publicity		
7. Banking		
8. Publishing		
9. Business		
Group IV†	6.06	5.26
1. Journalism		
2. Short Story Writing		

* The names in parenthesis designate the general fields covered in those groups.

† Not included in the test.

TABLE 1—*Continued*

SUGGESTED LIST OF VOCATIONS	FIRST CHOICE IN TOTAL PER CENT	SECOND CHOICE IN TOTAL PER CENT
*Group V (Science, etc.)**	5.26	5.26
1. Medical Social Work		
2. Medicine		
3. Biological Work		
4. Technology		
5. Chemistry		
6. Bacteriology		
*Group VI (Law)**	0.75	0.75
1. Law		
Group VII†	0.75	0.75
1. Art		
2. Architecture		
Group VIII†	0.75	0.75
1. Music		

woman's privilege to change her mind." In addition, one fourth would change their academic major if they had the opportunity. The willingness to change the academic major is more explainable, but both seem to emphasize the unreliability of choice in either case and the need for more accurate vocational and educational guidance in the selection of a vocation and of an academic major.

II. Correlations

a. The relationship between choice and the Vocational Test scores for all students are shown in table 2.

These correlations are all "low" (7); further if the test has any validity, they seem to verify the results obtained above in relation to change of choice, namely, the undesirability of using choice as the reliable index of interest in guidance. In other words, only 24 per cent followed their first choice, 27.8 per cent their second, and 20.3 per cent are pursuing vocations in other fields not mentioned in their choices. It is also very probable that of all these numbers there are some who are still unsettled as to permanent selection.

b. The relationship between Intelligence (scores determined by the Thorndike Intelligence Examination for High School Seniors) and scores obtained in this vocational test for three groups of students follows (table 3).

The correlations between the Vocational Test scores and the Intelligence Test scores for all students seem to be "low," showing no relationship. The vocational test was intended

TABLE 2

TEST NAMES	CORRELATION BETWEEN CHOICE AND VOCATIONAL TEST
Group I (Educational and Social Service)	0.21
Group II (Homemaking)	−0.02
Group III (Business)	0.17
Group V (Science)	0.05
Group VI (Law)	0.33

TABLE 3

NAME OF VOCATIONAL TEST	CORRELATION COEFFICIENT—INTELLIGENCE SCORES AND VOCATIONAL TEST SCORES		
	All students	Phi Beta Kappas	Journalism choices
Group I (Educational and Social Service)	−0.08	0.38	−0.28
Group II (Homemaking, etc.)	0.19	−0.04	0.15
Group III (Business)	0.30	0.41	0.57
Group V (Science)	0.10	0.12	0.94
Group VI (Law)	0.28	0.23	0.79

to test the ability to recognize information based on interests. The person therefore who has a deep interest in Law, for instance, as a probable vocation, need not necessarily be of superior intelligence. One deduction then is that for specific guidance we cannot rely upon Intelligence Tests for an unselected group.

The correlation of the same test scores for selected groups show a few interesting correlations. The Phi Beta Kappa

group show "marked" (7) correlation in tests for Group I (Educational and Social Service) and Group III (Business). The group selecting Journalism as a vocational choice shows one "high" (7) correlation in the test for Group III (Business) and two "very high" (7) ones in Groups V (Science) and VI (law). There seems, then, to be some relationship between Intelligence Test scores and these Vocational Test scores in special groups. In addition, there were 57 per cent of those selecting Journalism as first choice who were above the median in all of these tests, while 42.8 per cent were above the median in all but one test; this might indicate that those selecting Journalism possess versatile interests.

c. The only correlations which show any significant degree of relationship follow (table 4).

TABLE 4

NAME OF TEST	CORRELATION BETWEEN VOCATIONAL TEST AND SUCCESS ESTIMATED ON A SCALE OF FIVE	
Group I (Educational and Social Service)	0.71	±0.05
Group II (Homemaking)		
Group III (Business)	0.81	±0.09
Group V (Science)	0.67	±0.07
Group VI (Law)		

One might state then, that since three of these coefficients of correlation supplemented by their probable errors (i.e., a correlation should be four times its probable error) are reliable and "high" (and one "very high") that the vocational test is capable of predicting fairly accurately (within these limits) degrees of success. The number of cases included represents 63 per cent of the original group, as 37 per cent are not pursuing paid vocations. There is no correlation for Homemaking as we did not take the estimates of success made by husbands seriously, first, because they, no doubt, would have been prejudiced by new factors, and second, because they probably would not have analyzed homemaking into its recognized components. No one is pursuing Law (the only other test for

which we have no correlation), in fact or in study, and no one is pursuing Art, Architecture or Music, mentioned by a few as their desired choices.

If degrees of interests are indicative of success it would seem that this test has some degree of validity which is a little more objective than (*a*) choices as the individual selects and holds to them, and (*b*) general intelligence tests as used for specific vocational guidance. If then, this kind of a test were enlarged to include all vocations and its validity as well as reliability proven within the desired limits, one could then use it as a substitute for many things used in present guidance. Present vocational guidance is "in the condition in which students of temperature were before the discovery of the thermometer, or any other scale for measuring temperature." For the most part vocational guidance directors up to the present time have been interested in organization and have about completed that phase of it, at least in theory if not in fact. The next logical step is to find some objective procedure that will suit the time at present available for guidance, the present vocational guidance staff, and the great numbers demanding guidance. This challenge is becoming most imperative.

REFERENCES

(1) WATSON, J. B. AND R. R.: Studies in infant psychology. Scientific Monthly, December, 1921.

(2) MOORE, B. V.: Some principles and practices of personnel selection with particular reference to graduate engineers, Psychological Review, Mon. Sup.

HOLLINGWORTH, H. L.: The psychology of functional neuroses Pub.—Appleton.

PRESSEY, S. L.: A group scale for investigating the emotions, Journal of Abnormal Psychology and Social Psychology, 16, 1921.

REAM, M. J.: The prediction of successful salesmanship. Carnegie Institute of Technology, 1921.

FREYD, MAX: A method for the study of vocational interests. Journal of Applied Psychology, 6, September, 1922.

(3) THORNDIKE, E. L.: Permanence of interests and their relation to abilities. Popular Science Monthly, 81, 1912.

THORNDIKE, E. L.: Early interests, their permanency and relation to abilities. School and Society, 6, 1917.

THORNDIKE, E. L.: The correlation between interests and abilities in college courses. Psy. Rev., 28, 1921.

(4) BRIDGES, J. W., AND DOLLINGER, V. M.: Correlation between interest and ability in college Courses, Psy. Rev., July, 1920, vol. 27.

(5) ALLEN, FREDERICK: A guide to the study of occupations. Harvard University Press.

(6) ADAMS, ELIZABETH KEMPER: Women professional workers. Pub.—Macmillan.

(7) RUGG, H.: Statistical methods applied to educational testing. Twenty-first Year Book of the N. S. S. E., Chap. III.

NOTES AND NEWS

SPECIAL CLASSES FOR FEEBLE MINDED AND SUB-NORMAL CHILDREN

Enrollment in schools and classes for feeble minded and sub-normal children in this country shows an extraordinary increase in the past twenty-two years, according to a report made public today by the Department of the Interior through the Bureau of Education. This increase does not show that a greater percentage of children are becoming mentally defective from year to year, but it indicates a growing interest on the part of cities, States, and private organizations in making provisions for this unfortunate class.

In 1900 the 29 schools reported had 10,217 inmates. Although city schools were not reported separately, it appears that there were then very few city classes for defectives. In 1918, 206 schools reported 55,-084 pupils The 214 schools in 1922 reported a total of 63,399 pupils. The enrollment has increased 15 per cent during four years. This is more than twice as much as the increase in enrollment in public elementary and secondary schools during the same time.

Three types of school for the mentally defective are shown in the report, viz., State institutions, private institutions, and city day schools. About one-half of the total number, or 133, are classes in city day schools, 51 are State institutions, and 30 are private institutions.

The principal increase in number of pupils has been in city day schools, which enrolled 18,133 in 1918 and 23,253 in 1922, an increase of 5149. The increase in the city schools shows a tendency on the part of local authorities to take care of local situations, in this way to do a great service to the child in keeping him with his parents, and at the same time to relieve the regular school teachers of a responsibility which should not be expected of them.

Total receipts of State institutions reporting for the year 1921-1922 amounted to $14,911,234. The expenditures for buildings and lasting improvements, teachers' salaries, books, etc., and current expenses, were $13,315,370. The total receipts of private institutions for the same period were $727,143, and the expenditures were $719,263. State institutions reported property with a total value of $45,821,771. The value of property of private institutions amounted to $1,460,862.

A bulletin containing a detailed statement on these subjects has been issued by the Commissioner of Education of the Interior Department.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

The British Association for the Advancement of Science, while resembling the American Association for the Advancement of Science, nevertheless differs from it in certain particulars.

"The objects of the British Association are: To give a stronger impulse and a more systematic direction to scientific enquiry; to promote the intercourse of those who cultivate science in different parts of the British Empire with one another and with foreign Philosophers, to obtain more general attention for the objects of science and the removal of any disadvantages of a public kind which impede its progress."

The Association, which was founded in 1831, meets annually for one week or longer at important centres, other than London, in England, and it occasionally meets in other parts of the British Empire.

The Association has met in Canada on three previous occasions, viz., in 1884, 1897 and 1909. Other overseas meetings have been held once each in South Africa 1905 and Australia 1914.

The average attendance at annual meetings of the Association for the eighty-three years previous to 1920 was 2330. The Toronto meeting affords an exceptional opportunity for intercourse between British, Canadian, American and European workers in Science.

A preliminary programme will be forwarded on application to the Local Secretary, British Association, Physics Building, University, Toronto, and those who intend to be present at the meeting are particularly requested to apply for this as soon as possible.

No technical qualification is required on the part of an applicant for admission as a member of the Association nor is there any limitation in respect of nationality.

The form of membership of most interest to Americans and Canadians, who are very cordially invited to join for 1924, is that of annual member.

Payment of $7.50 made before or at the meeting entitles the annual member to attend the meeting and to receive the report. Payment of $5.00 entitles the member to attend the annual meeting and the membership ticket admits the holder to any of the sectional meetings and to the various popular lectures, receptions, local excursions, etc., which are features of the meeting.

Membership tickets for the meeting may be obtained from the local Hon. Treasurer, British Association, Room 50, Physics Building, University, Toronto; cheques should be made payable to the British Association for the Advancement of Science.

Arrangements are being made with the Railway Companies for reduced rates on the return fares of those who hold membership cards.

Hotel accommodation should be reserved in advance of the date of the meeting.

Scientific meetings

The Inaugural General Meeting will be held on Wednesday, August 6, when Major-General Sir David Bruce, K.C.B., F.R.S., will assume the Presidency of the Association in succession to Professor Sir Ernest Rutherford, F.R.S., and will deliver the Presidential Address.

The Association is organised in thirteen sections, those of chief interest to readers of this journal being: Economic Science and Statistics, Sir William Ashley; Anthropology, Dr. F. C. S. Shrubsall; Physiology, Dr. H. H. Dale, C.B.E., F.R.S.; Psychology, Prof. W. McDougall, F.R.S.; Educational Science, Principal Ernest Barker.

Addresses will be delivered by the Sectional Presidents of the respective sections and papers will be read on and after Thursday, August 7, until the conclusion of the meeting.

Joint meetings of various sections will be held also at which the following are among the subjects to be discussed: Sections B and I, Vitamines and the relation of light to their action; Sections I and J, Physiological and psychological factors of muscular efficiency in industry; Sections J and L, Tests for scholarship and promotion; Sections H and J, Racial mental differences.

During the week of the meetings a number of popular lectures will be delivered by prominent visitors. Among the titles which have been announced are: "Human Heredity and National (or racial) Outlook," by Professor W. McDougall, M.B., F R.S.; "Seeing is Believing," by Professor E. P. Cathcart, M.D., F.R.S.; "Voice Production" by Sir Richard Paget; "The Importance of the Infinitely Small in Nutrition," by Professor J. C. Drummond D. Sc.

A lecture to the Workers Educational Association will be delivered by Professor R. H. Tawney of Oxford University.

The subject of the Presidential Address by Sir David Bruce will be "Advances made in our knowledge of disease (with special reference to methods developed during the war)."

Additional information will be gladly supplied by the Local Secretary, British Association, Room 50, Physics Building, University, Toronto, Canada.

Summary of Programme of Section L—Education May 8, 1924

The President's address will be delivered by Ernest Barker M.A., D.Litt., LL.D., Principal of King's College, London, well known for his writings on political history and thought, who will speak on the subject "The Nature and Conditions of Academic Freedom in Universities."

The programme in brief is:

General. "Teaching of the History and Geography of the British Empire," by Professor Wrong, Toronto.

"Modern Tendencies in Geography Teaching," by E. Young F.R.G.S., Secy. Middlesex Education Committee.

"Interchange of Teachers between Different Branches of Education," by Prof. P. T. Nunn, Principal London Training College.

"Modern Developments in Method and Scope of Adult Education," by Dr. Heath.

"Modern Developments in Science Teaching," by Mr. C. N. Stewart.

"The Place of Classics in a Secondary School Education," by Mr. Legge.

"The Canadian University," by Sir Robert Falconer.

"An Educational Experiment in Rural Saskatchewan," by Prof. G. M. Weir, University of British Columbia.

"The Adolescent Education Act in Ontario," by Major J. P. Cowles.

"Selection of Pupils for Auxiliary Classes," by Dr. S. B. Sinclair.

"Educational Administration in Canada," by Rev. Canon Cody (late Minister of Education for Ontario).

"The Psychologist and the Education Committee," by Dr. Cyril Burt, London County Council Education Department.

"The new Curriculum for French Secondary Schools," by Mr. A. H. Hope.

Joint Sectional Sessions. With Psychology Section.

"The Use of Partial Coefficients of Correlation in Educational Research," by Messrs. Sandiford, Brennand and Holmes, Toronto.

"Tests for Scholarship and Promotion," by Dr. Cyril Burt.

"The Training of Pupils Intended for an Overseas Life."

Popular Lectures.

"Sense of Humour in Children," by Dr. Charles Kimmins M.A., Chief Inspector of the Education Department, London County Council.

"Voice Production," by Sir Richard Paget.

BUREAU OF EDUCATIONAL AND VOCATIONAL GUIDANCE

The University of North Carolina has established, under the direction of the Department of Psychology, a bureau for the investigation of methods for promoting the educational adjustments of its students, and for psychological guidance in the choice of vocations and in adaptation to the various phases of student life. The major problems which are to

be undertaken by this bureau are the assembling of a complete bibliography upon various phases of vocational and personnel work, the collecting and administering of available tests for the measurement of mental and vocational aptitudes, the administration of tests of intelligence and other traits to freshmen, and the working out of an administrative technique whereby the results of such tests may be made effective in the organization of college work, the development through research of a suitable group scale for the measurement of fundamental personality traits, the promotion of mental hygiene among students by general methods and more particularly by the individual treatment of students whose work is handicapped by emotional conflicts and other nervous conditions. The work at North Carolina is still in its infancy, but it is hoped that progress will be made toward supplying at this university a need which is now realized by many educational institutions. The purpose of this notice is to enlist the advice and coöperation of similar personnel organizations throughout the country. Address: The Bureau of Personnel Research, Department of Psychology, University of North Carolina, Chapel Hill, N. C.

BOOK REVIEWS

A. J. Snow. *Problems in Psychology.* Henry Holt and Company, New York, 1923.

In this small volume the author has collected approximately one thousand problems related to the major aspects of psychology. The author states that no attempt has been made to select the problems with the thought of developing a single psychological point of view. On the contrary care has been taken to direct the student's attention to different points of view. The problems are grouped into seventeen sections. The first sixteen of these bear chapter headings usually found in modern books on psychology. The last chapter containing two hundred and ten questions relates to the different fields of psychology, including animal, social, and general psychology.

Good problems are always valuable in teaching any subject but are not always ready when the occasion demands. This collection of problems will tend to supply this deficiency and materially aid in making the teaching of psychology more concrete. In doing this, it will serve a definite pedagogical purpose. The *Problems in Psychology* will be found to be a valuable supplement to the text-book and references in any course in psychology.

William Sims Allen, Ph.D. *A Study in Latin Prognosis.* Teachers College, Columbia University, Contributions to Education, No. 135. New York City, 1923.

The author of this monograph attempts to show to what extent success in Latin can be predicted by the use of certain standardized tests. As a basis for his conclusions the author studied the success in Latin of three hundred and sixty-four boys electing this subject in the Boys' High School, Brooklyn. They were divided into eleven classes taught by four teachers. The class grouping was based on the results of the Otis Group Intelligence Scale given in June before entering High School in September.

For the purpose of selecting a test or a group of tests that would have prognosis value, twenty some different tests were given at the opening of school in September. The list of tests follows (page 3):

1. Briggs Analogies Test Alpha
2. Briggs Analogies Test Beta
3. Thorndike-McCall Reading Scale Form 3

4. Thorndike-McCall Reading Scale Form 4
5. Kelley-Trabue Completion Test Alpha
6. Kelley-Trabue Completion Test Beta
7. Thorndike Test of Word Knowledge Form A
8. Thorndike Test of Word Knowledge Form B
9. Thorndike Non-Language Test Forms IA, IL, IIB
10. Terman Group Test of Mental Ability Form A
11. Terman Group Test of Mental Ability Form B
12. Rogers Test of Mathematical Ability
13. Free Association Test
14. Wylie Opposites Test A
15. Wylie Opposites Test B
16. Wylie Opposites Test C
17. Wylie Opposites Test D
18. Wylie Opposites Test f
19. Wylie Opposites Test l
20. Wylie Opposites Test r
21. Wylie Opposites Test t

It will be seen that the author in selecting the prognosis tests made extensive use of those that measure language ability in its various phases.

At the close of the first semester eleven pairs of Latin tests were given. Professor Briggs in devising these Latin tests sought to isolate and measure the different phases of Latin taught during the first semester. The list of these tests follows (page 7):

1. Syllabification Tests Alpha and Beta
2. Gender Tests Alpha and Beta
3. Nouns Alpha and Beta
4. Pronouns Alpha and Beta
5. Conjugation Alpha and Beta
6. Vocabulary Alpha and Beta
7. Derivation Alpha and Beta
8. Construction Alpha and Beta
9. Pronunciation Alpha and Beta
10. Translation: English to Latin Alpha and Beta
11. Translation: Latin to English Alpha and Beta

The results of these tests were tabulated and given the usual statistical treatment and yield three prognosis tests with high reliability and fair predictive power.

The first prognosis test is composed of Briggs Analogies Alpha, Thorndike Test of Word Knowledge A, and Rogers Interpolation 2. The test requires thirty-five minutes to administer and yields results with a reliability of 0.880 and gives a prediction of 0.559.

The second test is composed of Briggs Analogies Beta, Thorndike Test of Word Knowledge B, and Rogers Interpolation I. This test also requires thirty-five minutes to administer and yields results with a reliability of 0.880 and gives a prediction of 0.578.

The third test consists of prognosis tests 1 and 2, and requires seventy minutes to administer with a reliability of 0.936 and gives a prediction of 0.588.

The results also indicate that the same groups of tests predict English and Mathematics success almost as well as they predict Latin success. It should be noted that the author does not recommend the exclusive use of these tests in admitting and excluding pupils. In the case of Latin other means should be used, including various school records, teachers' marks, teachers' estimates, and personal conferences.

Such studies as this one are valuable not only for specific facts pointed out but as a method of approach to one of our perplexing problems.

PERCIVAL MALLON SYMONDS, PH.D. *Special Disability in Algebra.* Teachers College, Columbia University, Contributions to Education, No. 132. New York City, 1923.

In this study Professor Symonds has given his attention to a special disability—disability in Algebra. The monograph is divided into nine chapters. He has also appended a selected bibliography of fifty-eight titles. The scope of the study can best be presented by a statement of the subject of the several chapters.

Chapter I presents the problem of special disability and suggests methods of study. In Chapter II there is a discussion of individual differences in Algebra as indicated by the results obtained from the use of tests by Hotz and Rogers.

Chapter III describes the results of a careful study of twenty-two pupils selected because of their special disability in Algebra.

In Chapter IV we find descriptions of the peculiar mathematical disabilities of several of the cases selected for study in Chapter III.

In Chapter V and VI methods for correcting coefficients of correlations for attenuation and selection are developed.

Chapter VII makes corrections of coefficients of correlation reported by different investigators. The methods used in making these corrections are those outlined in Chapters V and VI.

In Chapter VIII we find the author's attempt to interpret the corrected correlations of Chapter VII as an agency in determining the amount and frequency of special disability in Algebra.

In the last Chapter the practical conclusions for school purposes are summarized.

Certain facts brought out by the study are of interest to students of applied psychology.

1. It seems clear that the last three months of school-year in algebra is only a fraction as profitable for the modal pupil as the first three months. The student has ceased to learn or he is learning something that can not be measured in the ordinary manner.

2. There is a genuine increase in variability of distribution toward the close of the year. This perhaps indicates that some pupils continue to learn even at the end of the year, while others stopped learning before reaching the end of the year.

3. The study of the twenty-two cases of special mathematical disability warrants the conclusion that "Those who have special disability in mathematics are not deficient in working with the other materials with which intelligence deals." Even disability in Algebra does not signify disability in geometry. There is evidence to indicate that special disability in mathematics is due to material or content and not form (page 27).

After correcting coefficients of correlation between Algebra and other studies the author reports the following summary:

Algebra correlates with geometry, English and intelligence.

	UNSELECTED POPULATION	HIGH SCHOOL FRESHMAN
Geometry	0.82	0.73
English	0.76	0.63
Intelligence	0.80	0.70

On the subject of the *frequency* and *amount* of *special disability* the author concludes that "high intelligence means good ability in Algebra and low intelligence means poor ability in Algebra." "Of the twenty-two brightest pupils out of the hundred seventeen will be above the average in Algebra, and of the twenty-two stupidest pupils seventeen will be below the average in Algebra."

The author does not undertake to say who should study Algebra. The answer to the question must in the main depend on other than psychological considerations. Psychology has made its chief contribution when it predicts algebraic ability. This, the author believes, can be done by the use of intelligence tests since there appears to be a high correlation between success in Algebra and intelligence. An understanding of special disability in Algebra will aid in considering courses of study, text-books, class assignments, and class periods.

While the study has limitations, on the whole it is a valuable contribution to education and should stimulate similar studies in other subjects.

FRANK N. FREEMAN AND MARY L. DOUGHERTY. *How to Teach Handwriting.* Houghton Mifflin Company, Riverside Press, Cambridge, Mass., 1923.

In *How to Teach Handwriting* the authors have made an excellent and timely contribution to our pedagogical literature. Too long have we waited for such a treatment of this subject. In this volume we have a teacher's manual of handwriting that is scientific as well as practical. The authors have been guided in the preparation of the *Manual* by the well established principles of handwriting resulting from the careful experimental studies of Professor Freeman. The results of his investigations have been fully described in his monograph entitled *The Handwriting Movement.*

As the title indicates it is a volume that will serve the needs of the class-room teacher as well as the supervisor of writing. The first thirty-four pages give a brief summary of the most important principles fundamental in learning to write. The major portion of the book gives details for conducting lessons in the subject. Much attention has been given to the selecting and arranging the exercises. As a result of this we have the course in writing for the first six grades outlined in detail. Definite goals for each stage of the six-year course have been determined, thus making it possible for the instruction in handwriting to go forward in a consistent and pedagogical manner.

The authors have in this *Manual* attempted to dispel two illusions that have had more or less influence on the teaching of handwriting. In the first place they have attempted to make it clear to those interested that satisfactory writing can not as a rule be left to chance and to incidental teaching of the subject. In the second place they have shown that the teaching of handwriting is not surrounded with mystery and difficulties which can be mastered only by a few especially endowed. In their treatment of the subject they point out that here we have a subject the learning of which follows certain fundamental principles that may be applied by the class-room teacher. This *Manual* will do much to clarify the writing situation in our schools, and to place the teaching of this fundamental tool of learning on a sane and scientific basis.

WILLIS L. GARD,
Ohio University.

J. E. W. WALLIN. *The Diagnostic Findings from Seven Years of Examining in the Same School Clinic.* Miami University.

This is a summary of the diagnostic findings of seven years' work in the St. Louis Psycho-Educational Clinic. Dr. Wallin says that no similar summary of diagnostic findings from a similar clinic for an equal period of time has ever been published before. In this study

Dr. Wallin finds a lower percent of feebleminded in the elementary schools of the St. Louis Public Schools than is believed by other workers in the field of clinical psychology. However, Dr. Wallin does not define what he means by the term "Feebleminded." He possibly is not including the higher types of mentally deficient people. Dr. Wallin states that the lower classes are not included in his percent. He stresses that every large school system must have, in addition to the special schools for feebleminded, a much larger number of ungraded classes for children who, while not feebleminded, are so backward either in intellectual or pedagogical status as to require individual instruction or a differentiated course of study. He says that as a result of this study that the number of pupils assigned to special classes should vary from 1 to 5 per cent of the elementary school population.

Considerable discussion and data are given on different types of mentally deficients such as the mongolians, cretins, epileptics, hydrocephalics, amaurotics, psychopaths, speech defectives, neurotics and delinquent children. He found nine times as many speech defectives among the special class children as he found in the total population of elementary pupils. This seems to show us that speech defect is a mental condition. Dr. Wallin says, in speaking of psychopathic children, that their conduct had changed from one of disorder to order after being placed in special classes.

The data contained in this pamphlet and the descriptions given are of highest value to educators interested in carrying out a complete school system.

La Vinia Warner,
Ohio University.

Walter Dill Scott and Robert C. Clothier. *Personnel Management, Principles, Practises and Point of View.* A. W. Shaw Co., 1923. Pp. xxii, 643.

The new "science in management" has now provided a manual of procedures and practises and a systematic point of view on the subject of individual human adjustments in industry. The volume crystalizes, in its application to industry, the experience of the Committee on Personnel in the Army and the work of the Scott Company in coöperating with more than forty industrial and business concerns. The scientific background of President Scott, his contact with the personnel research bureaus at the Carnegie Institute of Technology and with the direction of classification of men in the army, Mr. Clothier's practical experience as employment manager of the Curtis Publishing Company and the accomplishments of the groups of men working with them have been ably organized into a systematic and consistent whole. Applied psychology is now able to stop and look about to see the personnel move-

ment in perspective, to ask what may have been neglected and what should be the next step.

The central idea from this stereoscopic view formulated by Scott and Clothier is the scientific study of the man-in-his-work for the purpose of both increasing the efficiency of production and the happiness of the worker through better adjustment of industry to individual differences. As the authors say, it is no longer the square peg in the round hole for both the man and the job are regarded as modifiable, changing, developing. The worker is not a machine, still less a commodity, but a human organism which is to be adapted to variable work opportunities.

This splendid contribution of a systematic viewpoint should lead no reader to classify the book as theoretical. Nine-tenths of the content is taken up with descriptions of specific instruments for facilitating human adjustments and careful directions as to how the methods are to be introduced and coördinated. The descriptions of the methods are accompanied by examples of their use in practise. The officers of any concern as well as those professionally interested in personnel work can thus obtain a comprehensive idea of the functions of a personnel department and detailed information of methods for the personal adjustment of a worker-in-his-work. The authors have chosen to describe one selected complete series of methods as worked out by their group of consultants, rather than to set forth the variety of forms of each method. The result is a thorough occupational description of the work of a personnel department as they see it. Approved practises are set forth for reaching the source of labor supply, occupational descriptions, application blanks, testing qualification cards, rating scales, promotional charts, training, personnel control charts, the introduction of the worker to his work, supervision and follow-up, incentives, procedure in making adjustments, and the use of personnel instruments in control of salary and of labor turn-over. Four appendices show the development of the graphic rating scale, of a plan for apprentice training, a summary of the literature on labor turnover and samples of reports after personnel surveys. The bibliographies throughout are excellent.

The Personnel Department is "principally a staff department," acting as "a connecting link between the officers who determine the personnel policies of an organization and the departmental executives whose duty it is to execute those policies." The description of staff and line functions is manifestly influenced by the organization of personnel work in the army. In the form of the instruments also, it is clear that the experience with the army has been highly valued. The methods, however, have been adapted to industrial conditions and have been tried out to show their usefulness. Even a concern with the most democratic organization of its employees instead of the common army type of responsibility, will need these personnel instruments for making

individual adjustments. The authors are confident that their "science in management" is widely different from "scientific management" as operated in the average plant. Their view stresses the fairer distribution of happiness among the workers as well as greater efficiency. They point out that labor has supported the work of the Personnel Research Federation and is not opposed to that scientific study of human relations which has sufficient regard for justice to the workers.

By leaving the determination of labor policies to company officers outside the personnel department, and by omitting all discussion of shop councils, labor organizations, collective bargaining, etc., it is clear that the authors have taken a distinctive point of view towards the functions of personnel administration. It might be characterized as an endeavor to stick to the strictly psychological problem of adjusting individuals and their work. It may even be the hope of the authors that this plan offers the best solution of the clash between organized groups of employers and employees. At any rate it is a distinctly different conception of personnel management from that commonly found in books on personnel administration. The problems of group psychology are obviously omitted. The authors wisely do not attempt to cover all questions connected with the human factor in industry. The book contrasts also with the contents and viewpoint of such a book as Myer's Mind and Work which s[illegible]e background for English movement to establish an independent institute of psychology and physiology to scientifically investigate the human problems of unrest in industry. The usefulness of psychology to industry is clearly not limited to problems of individual adjustment, although here Scott and Clothier have demonstrated that it has quickly advanced far in technique and assurance of success.

The final chapter on Research is almost a classic in its brief and vigorous statement of prevalent attitudes of industrial and business executives which make it difficult for them to acquire a scientific attitude toward their personnel problems. To the alert and far-seeing executive, scientific personnel study affords not only a promise of high reward to his concern but also the means for it to attack the "diseased" industrialism of which Carleton Parker warned, and to meet its obligation to work toward greater social justice as well as against economic waste. Such industrial leaders should be inspired by this spot-light which shows clearly one road up which to advance.

In this early stage of the science of personnel, applied psychologists can hardly be blamed if they treat this highly authoritative book almost as if it were written on tablets of stone.

J. B. Miner,
University of Kentucky.

DANIEL ALFRED PRESCOTT, Ed.D. Psycho-Educational Clinic, Harvard University. *The Determination of Anatomical Age in School Children and Its Relation to Mental Development.* Harvard Monographs in Education. Whole No. 5, Series 1, No. 5. Cambridge, Mass. The Graduate School of Education, Harvard University. July, 1923.

This interesting study is based on the measurements of radiographs of three thousand children. Its purpose is to establish norms of anatomical development and to measure the deviations of certain individuals from these norms and from the norms for mental development, with a view of finding out something of the relationship between physical growth and mental development. This should be of interest to educators, to those interested in athletics and also to students of child study. The anatomy of the wrist was taken as the index for this study and X-ray pictures were taken of the wrists of both boys and girls.

Extended references were made to Mr. Rotch, also Mr. Smith of the United States Naval Academy, and Mr. Woodrow and Lowell and others. Children from six years on up into adolescence and some adults were included in the study. Both normal and feebleminded individuals are included. A chapter is given to the description of the apparatus and the method used in finding these measurements.

It was found through this study that the mentally deficient are also retarded anatomically, that is, the mental deficients were discovered to be lacking in a well rounded, complete development. It was discovered that girls are about eighteen months ahead of boys throughout the whole period of growth, from six to maturity.

A chapter is given to case study which is very interesting to the student of mental, physical and anatomical growth of children.

M. LA VINIA WARNER,
Ohio University.

LILLIEN J. MARTIN. *Mental Training for the Pre-School Age Child.* Harr Wagner Publishing Co., San Francisco, 1923. 100 pp.

Following a brief foreword this little book consists of I, a Mental Hygiene Questionnaire; II, discussion of a child's training from the standpoint of heredity, physical and psychological examination, interaction of the mental and physical, imitation, habit making and breaking, emotional development and control, incentives to action, dependence versus independence, responsive versus resistent attitude, environment, storing the subconscious, play, delinquent tendencies, punishment and sympathy; and III, the Education of the Parents.

Part I gives a list of seventeen questions to which answers are secured from mothers whose children Dr. Martin examines. This is a valuable

list of questions not only for all parents but for all teachers responsible for the training and educating of growing children. While not an exhaustive list of all questions which might be asked, it is very complete because directed at the vital sources of life's fundamental driving and directing forces. In Part II the content of each of these questions is transformed into a positive constructive statement called a rule. After a brief, well chosen discussion and explanation of each of these 17 rules, the histories of several children are given in sufficient detail, but not tedious, to show specifically how the rule applies in solving problems of individual children. This gives value and vividness to the theory brought out in the discussion and makes the entire book very readable and practical.

Part III is very brief. In it the responsibilities of parenthood are emphasized.

This book gives simple directions for the training of young children upon a scientific basis. Such training when intelligently given is humane beyond comparison with any other method. It is so simple and practical that no parent or teacher can help but learn much from studying it.

HERMAN H. YOUNG,
Indiana University.

EDGAR DUNNINGTON RANDOLPH. *The Professional Treatment of Subject-Matter.* Baltimore, Warwick and York, 1924. Pp. 202. $2.20.

The author brings to this study a rich background of experience in the public schools, in normal schools, in a liberal-arts college, in a teachers college, and more recently in a department of education in a great western university. The interest centers in the problem: Should instruction in subject-matter in a teachers college be differentiated from that given in the same field in schools of general education? In other words, does the responsibility of the teacher of teachers in a given subject differ from that of a teacher of the same subject in a liberal-arts college? Through a discussion of the development of the idea of the professional treatment of subject-matter and a consideration of the present conditions of that interest, the specific needs of teacher-training are presented (1) as to the needs of teachers—"scholarship, technique, and professional intelligence," and (2) as to the work of teacher-training institutions—the character of the organization of instruction, the more significant phases of faculty organization, and certain details of the administration practice. By comparison and contrast, the author points out, through the discussion of the functioning of the liberal-arts college, the so-called academic normal school, and the purely professional normal school, the achievements and the failures of teacher-training. Among the latter, there is mentioned "the peculiar field of the

professional purpose,—the conscious adaptation of instruction to the characteristic responsibilities of public-school teachers and to the typical pressures of their occupations on them." The conclusion is that the achievement in the professionalization of subject-matter has depended upon the professional attitude of teachers of teachers in professional schools; and by the term "professional attitude" is meant that "the teacher of teachers shall be so sensitive to the needs of the service and so well acquainted with the characteristic pressures upon the public school teacher that he will consciously shape his instruction in the interest of both." In the fourth and last chapter, "Some Suggested Applications," an attempt is made to exemplify "professionalized" work in geography, literature, and arithmetic, as "a teachers college would feel bound to illuminate the topics covered in the public school courses of study in its tributary region, and to transcend the treatment given in the best elementary school textbooks."

Criteria for appraising this monograph are not offered in a preface. After his "Acknowledgements," the author proceeds to state the problem and to make an interpretative analysis of relevant historical materials. The ten pages of bibliographical notes include materials from a wide range of sources and indicate that the scattered literature on the subject has been carefully assembled. The author, who exhibits the qualities of scholarship and "subtle knowledge" which he insists are essential to the successful professional teacher, has arranged his materials to demonstrate that professionalizing academic materials has been the work of the normal schools; and, in these, only sporadic instances appear. The illustrative materials, calculated to demonstrate principles established in the three earlier chapters, admirably convey the professional ideals of scholarship and method. To the student of this pertinent problem in teacher-training, this work appears as a unique contribution, which should pave the way for efforts to professionalize subject-matter not only in the professional schools but also in the specialized departmental work of other institutions.

EDWIN B. SMITH,
Ohio University.

FREDERIC LYMAN WELLS. Pleasure and Behavior. D. Appleton and Co., New York, 1924. Pp. 274.

If one wishes to study the psychology of pleasure this book will form an interesting introduction. It is to be remembered that it is the psychology of pleasure and not of happiness that is the subject of the work though the author consistently confuses the two; and perhaps deliberately.

The book is strongly influenced by psycho-analytic concepts and takes the "tough-minded" attitude generally. It deals chiefly with

instincts and "urges" as in a discussion of "pleasure" it should. The author expresses his view that everyone is working for his own pocket all the time—"just the same (gentle reader) as you are," without adequate recognition of the fact that the gentle reader in working for his own pocket is also working for his author's pocket; and doing so consciously and heartily.

It is a difficult task that the book essays: to present the foundations and growth of the affective life of the individual in its natural and human settings. This involves constant reference to history, anthropology, ethics, physiology and other sciences. It is not strange that exception may be taken to many of the statements in such a composite. And yet for a complete account these and other detailed studies of man are necessary. The problem is in large part one of synthesis. The ethical thinker should be grateful for this pleasant and happy presentation of many important facts. In regard to their synthesis and interpretation he may still hold reservations.

HARRY CHRISTOPHER HUMPHREYS, PH.D. *The Factors Operating in the Location of State Normal Schools.* Teachers College, Columbia University Contributions to Education, No. 142. New York City, 1923. Pp. 152.

This is a valuable study of an important subject; but the title promises both more and less than the study includes. The book deals with the political factor in the location of the normal schools in four states; and with other factors, such as donations from cities or the distribution of existing schools in some eight or ten states. It should be said that there is an appendix composed of excerpts from the laws dealing with the establishment of state normal schools in forty-three states. The study clearly shows the presence and the potency of unworthy determinants of the location of our state normal schools.

What is really a second study not indicated in the title of the book is found in Chapter V. This chapter is entitled: "A Comparative Study of State Normal Schools in Selected States." Four contiguous eastern and one southwestern state are studied, chiefly with regard to the student enrollment and distribution of their state normal school population. This is a significant study and of course bears upon the wisdom of the present locations of the schools in the selected states. But there is no attempt to compare the educational standards, faculties and general effectiveness of the schools themselves. Yet such matters must surely affect the enrollment and distribution of the students; so also must, for example, the age of the school, its advertising policy and the strategy and loyalty of its alumni.

The study eventuates in a theoretical technique for the location or re-location of state normal schools and in several entirely defensible

recommendations. While not a definitive treatment this is a worthy beginning of a thorny subject. Some day the location and re-location of state and private universities may be studied. What slight and even ridiculous factors have determined locations may be seen, for example, in the case of Cornell, in the autobiography of President White.

WALTER S. MONROE AND LLOYD B. SOUDERS. *The Present Status of Written Examinations and Suggestions for their Improvement.* Bureau of Educational Research, College of Education, University of Illinois, 1923. Bulletin No. 17. Pp. 77. Price 50 cents.

This very excellent bulletin is just what its title indicates. It is both informing and suggestive. It contains important original studies. It should be carefully read by all teachers. And while none should neglect to ponder, the more unballasted members of the profession should especially try to discover the meaning of the perfectly indispensable reservations tucked into two paragraphs on pages 61 and 62. By and by the newer type of written examinations will find their proper place beside the old. This study should help to hasten that day.

BIRD T. BALDWIN AND MADORAH SMITH. *Educational Research.* Bureau of Education, Washington, D. C. Bulletin, 1923, No. 42.

This is a classified bibliography of 572 titles of research articles published in American educational magazines and a few American books dated from 1920 to 1922 inclusive. Preceding the bibliography there are very brief summaries of the range and conclusions of the studies listed as well as mention of various foundations, experimental schools and periodicals which carry on research, or publish the reports of research.

The definition of research used by the compilers does not include historical and philosophical researches. To historical students it may appear to be some slight consolation that, according to that definition this bulletin itself is not research for it is purely historical.

H. G. GOOD,
Ohio University.

HOMER E. COOPER. *Cost of Training Teachers. A Method of Determining Cost and Its Application in the State of New York.* Warwick and York. 112 pp. Price $1.60.

This book is quite naturally of greatest interest to those interested in the training of teachers in the State of New York. The author has made a very careful study of the cost of training teachers in that state and of the extent to which the state is meeting the problem of supplying trained teachers for its schools.

It is interesting to note that during the period from 1909 to 1921 the highest percentage of all certificates issued going to trained teachers was reached in the four periods from 1911 to 1915. In the period from

1919 to 1921 only 25 per cent of the certificates issued were issued to trained teachers.

The methods used by the author in determining the cost of training teachers and the relation of the supply of teachers to the demand will be of interest to all persons interested in these problems.

A. F. MYERS,
Ohio University.

ARTHUR I. GATES. *Psychology for Students of Education.* Macmillan Company, 1923. Pp. 489.

One would have some timidity in producing a book designed primarily as a text in the psychology of advertising and selling but which might also serve as a text in general psychology where such is needed! Yet, absurd as this would seem in connection with its business applications, psychology is even yet too commonly so treated in its educational bearings. Thus the author in this otherwise excellent book states that, "while the book has been written to satisfy the needs of students of education primarily, it may be found serviceable as an introductory text in general psychology." The pity is that a job so well done could not have been worked out to contribute more directly and more practically to the many problems prospective teachers must face, either with or without the aid they have a right to expect from the psychological instruction so often even forced upon them under the name of educational psychology.

The too common tendency of the past has been for our educational psychology to differ from general psychology in little but name. We have been inclined to feel that a knowledge of the general mental processes, and the ideals of development *in general* is all that is necessary for their proper guidance, or, at least, that with this as a background the teacher can work out the details. The sad thing is that too often the teacher entering his practical work has little but background and that even here the "haze" is the most conspicuous part. He has been trained in the easy generalities and left to struggle through the difficult task of their detailed application unaided.

While we can never, perhaps, hope to duplicate, in our instruction, the actual and specific problems the teacher will face in the field, still the closest approximation to these is desirable. Consequently those writing our texts in educational psychology should be less fearful about omitting many of the time-worn discussions of the general field (important though they may be there) and of searching out and dealing practically and in detail with the most important psychological problems occurring in the actual class room. We must realize more and more that we are training practical teachers, not laying the foundations for future "pure" psychologists. Thus, for example, the text in educational psychology

should give us more of the results of practical experimentation and demonstration of how children learn and retain their various number combinations, and of the shortcomings of our teaching of these things in the past and how they might, in the new light, be improved, rather than to spend the time explaining, in abstract and hypothetical neurological terms the formation and retention of those bonds. The field is full of these insistent, practical problems. Why should we not shift the point of emphasis a little from the traditional toward the vital, practical considerations all teachers will have to meet?

It is in the hope that Gates may have taken a bigger step in this direction than examination of his book proves to be the case, that one feels disappointed. Yet comparatively he has done a very good job and the book should be welcomed as a real contribution by the hundreds of instructors looking for the best to be had in this field which admittedly needs a good deal of re-constructing and shifting of emphasis. In addition to the chapters dealing with the customary matters of sensory experiences and their gradual integrations into and with the higher ideational processes, he gives much space to the various phases of the learning process, original capacities, correlation of abilities, intelligence and its measurement, transference of training, teachers grades, etc. which, in their clean-cut treatment, will greatly aid the instructor whose plan is to make these things of real, functional value in the training of teachers for actual, effective work in the field.

F. B. KNIGHT AND G. M. RUCH. *Syllabus for a First Course in Educational Psychology.* Iowa Supply Company, Iowa City, Iowa, 1923.

This manual has been written to supplement Gates' *Psychology for Students of Education.* In the words of the authors, "the lessons and assignments will follow this text closely. In the main each lesson in this syllabus will match a chapter in the text. It is therefore essential that the student spare no pains in the genuine mastery of each chapter. In preparing each chapter the student should be sure to do all that is asked for in the syllabus." It is plain, from the amount of work outlined for each lesson, as well as from the meager references to other sources, that intensive mastery of the text is what is desired. This, perhaps, is a good thing, stressing as it does the *mastery* of something, in the place of the too-common smattering over a broader field, yet it has its inherent dangers, in some hands, of unduly mechanizing or stereotyping the course and of creating the impression that the field of educational psychology and the contents of a book are synonymous.

In substance, the authors claim two general advantages from the use of this syllabus: (1) a great saving of effort and time for instructors who are overburdened with large classes and heavy schedules, and (2) the formation of economical and effective habits of study on the part of

students using it. It is probable that anyone examining this syllabus carefully will feel that both of these advantages will be abundantly realized. The student conscientiously making the preparations as directed is bound to carry away from the course, not only many well selected facts but also an increased capacity for effective study, while the one who grudgingly makes his preparations can, with a minimum of trouble to the instructor, be urged into doing a grade of work otherwise impossible.

Probably the most valuable features of the syllabus are the suggestions for study, much at variance with the study concepts and habits of the average college student, yet in keeping with the best and latest findings on the matters of learning and of study. For the sake of brevity some of the more important of these will merely be listed:

First, study of each lesson is to be broken into at least two periods; the first to get the facts from the text according to the syllabus outline for the chapter; the second for the review of these facts after a period of two or three hours have elapsed, and to re-read and correct any work thus found not to be well understood. This is a good start toward a spaced study or repetition seriously lacking in the average student's study program.

Second, in view of the near futility, for permanent retention, of a single reading it is interesting to note, time after time, instructions similar to the following for the study of the various chapters of the text: "(1) Read the sub-topics of the chapter in the table of contents, pp. xiii. Before reading the chapter spend a few minutes organizing what you already know concerning each topic listed on pp. xiii. Take time to frame for yourself questions, on each topic, that you expect the chapter to answer. (2) Read the entire chapter 'for intellectual fun'; i.e., as though you were not to be tested upon your study but wanted to find out the facts for your own satisfaction. (3) Re-read the chapter with the notes (Section II) and the Class Preparation (Section III) in mind." These are the instructions, in part, for the study of Lesson 11 in the Syllabus.

These careful readings, with frequently two re-readings, for the general grasp of the contents of the lesson as well as for the solution of specific problems involved in it, cannot but greatly improve the general preparations, and attitudes toward preparations, of the students doing them. As further incentives to good study, additional work is usually outlined for additional credit, though the exact nature of the additional credit does not seem to be specified.

All through the syllabus are to be found many types of appropriate suggestions, exercises, questions, etc. to be worked out carefully and put in written form in spaces provided for their recording, and in addition to these, a few of the most significant, from the standpoint of the

authors, of the questions and exercises following the chapters of the text are indicated for special study and recording in the manual. Not only are these exercises valuable as worthy content in themselves but, to the instructor who desires to add things of his own choosing to suit his special conditions and purposes, they are sources of valuable suggestion. The manual should receive a hearty welcome not only from those already using Gates' *Psychology*, but should open the way for the adoption of that text by others who might otherwise hesitate in taking that action.

HENRY EASTMAN BENNETT. *Psychology and Self Development.* Ginn and Company, 1923. Pp. 296.

According to the author "the selection and rejection of material of this book has been an evolution in the classroom during many years of search for (1) that which will function directly in increasing the student's capacity as a learner; (2) that which will afford the most useful basis for a course in teacher-training; (3) that which will best meet the needs of a first course in college psychology; (4) that which, instead of merely skimming the cream of interest will definitely project the student's interest and expectation toward a fuller and more adequate pursuit of the subject; (5) that which will best help the young student to maintain his poise amid the dizzying enlargements of his mental horizon as he climbs the ascent of higher education and thinks he sees dark chasms yawning between his new knowledge and his old faith."

With these purposes and ideals in mind, "a lot of territory" to presume to cover in so brief a treatise, the author proceeds to express in simple and very readable language the generally accepted facts in the fields discussed, "admitting nothing which is merely argumentative or speculative which is not essential to the scientific integrity of the whole plan or practically applicable to the needs of the learner, and to omit nothing which properly belongs to a thorough first course in psychology. The functional viewpoint and the physiological basis have been woven into every chapter. A close-knit system of treatment has been sought which explains all psychical phenomena in terms of associations and progressive integration and the conditions which forward or retard these."

Anything unusual or of special interest in the book, however, is to be found not in a survey of the table of contents, which is closely similar to that of the traditional introductory psychology, but to special ways of statement or treatment under these heads. The book commences with a chapter on "The Art of Learning" in which some valuable advice on study is given under such captions as, "Learn Strenuously," "Question Constantly," "Organize," "Outline," "Learn to Take Notes," etc., with the reminder that one's practical problem is not to worry

about the native ability which has been given him but to make the most effective use of what he has. In the second chapter, under the heading, "The Basis of Learning" is a discussion of the customary facts of elementary neurology. Chapters on "The Original Capital," "Habit," "Sensation," "Concepts," "Judgments," etc., follow. In these the point of view and treatment are usually consistent and up-to-date. For example, in his treatment of instinctive tendencies in man he states, "it is not usually any definite kind of act, but rather a vague tendency to a certain attitude under certain conditions. . . . . Few acts of mature life may be regarded as mainly instinctive, because of the large element of learned activities which inevitably enter into them. Nevertheless, there enter into all conduct of whatever kind some instinctive influences. Back of every thing we do is a cause in the form of that vital push, blind instinct more or less educated to rational efficiency. . . . . Education gives the direction and form to one's acts, but the reason for one's acting at all, the primary thing that makes things go, the real motive power for all conduct, is found somewhere deep below the surface in these instinctive impulses (pp. 35–36)." Most parts of the book are thus very readable and will appeal to the beginning student, and, we believe, give him a desire for more about which he is reading, which cannot be said of all texts in psychology.

The "sins" of the book, if we may mention some of them are rather "sins of omission" than of "commission." One is justly surprised in reading a book purporting to be a text in educational psychology, to find no mention in the index, and practically no mention if any in the body of the text, of such matters as general intelligence, intelligence testing, I.Q., individual differences, statistical methods, correlation, median, mean, etc. These are simply indicative of some of the vital considerations one would expect to find in a text in educational psychology. They are the very tools with which investigation that is worth while must largely be made. Things of almost equal importance have been omitted, from the standpoint of general psychology, so far as modern "moves" are concerned. This perhaps is due in some part to the too-common attempt to cover too much territory, in fields which are much more incompatible than has been imagined, in a treatise of the size of this text.

Yet, in spite of these omissions, the book will be found to be of real value, at least as a supplementary text, for beginning college students.

H. J. Peterson,
Ohio University.

NEW BOOKS AND PAMPHLETS RECEIVED[1]

Books and pamphlets for review should be sent to James P. Porter, Department of Psychology, Ohio University, Athens, Ohio.

Anatomical Age in School Children and Its Relation to Mental Development. DANIEL ALFRED PRESCOTT. Psycho-Educational Clinic, Harvard University. Harvard Monographs in Education. Whole No. 5. Series 1, No. 5. Harvard University, Cambridge, Mass.

Brain and Intelligence. BERNARD HOLLANDER. The Ethological Journal, October, 1923. 57 Wimpole Street, London, W. 1. 18 pp.

Cost of Training Teachers. HOMER E. COOPER. Warwick & York, Baltimore, Md. $1.60. 112 pp.

Critical Study of Certain Measures of Mental Ability and School Performance. INEZ MAY NETERER. Warwick & York, Baltimore. $1.80. 141 pp.

Development of a Verbal Concept of Relationship in Early Childhood. MARTIN L. REYMERT. Scandinavian Scientific Press. Sogaten 2, Kristiania, Norway. 83 pp.

Factors Operating in the Location of State Normal Schools. HARRY CHRISTOPHER HUMPHREYS. 152 pp. Teachers College Series, Columbia University, New York City.

How to Teach Handwriting. FRANK N. FREEMAN AND MARY L. DOUGHERTY. Houghton Mifflin Company, New York City. $1.80. 305 pp.

Laboratory Manual in Psychology of Learning. WILLIAM H. PYLE. Warwick & York, Baltimore, Md. $1.50. 161 pp.

Love in Children and Its Aberrations. OSKAR PFISTER. Dodd, Mead & Company 443 Fourth Avenue, New York City. $7.50. 576 pp.

La Neurasthenie. DR. MAURICE DE FLEURY. Librairie Felix Alcan, 108, Boulevard Saint-Germain, Paris. 173 pp.

Mental Training for the Pre-school Age Child. Harr Wagner Publishing Company. San Francisco, 1923. 100 pp.

Personnel Management, Principles, Practices and Point of View. WALTER DILL SCOTT, AND ROBERT C. CLOTHIER. A. W. Shaw Company.

Pleasure and Behavior. FREDERIC LYMAN WELLS. D. Appleton & Co. New York City. 115 pp.

Problems in Psychology. A. J. SNOW. Henry Holt & Co. New York City. 115 pp.

---

[1] Mention here does not preclude further comment.

Professional Treatment of Subject Matter. EDGAR DUNNINGTON RANDOLPH. Warwick & York, Baltimore. $2.50. 202 pp.

Psychology and Self-Development. HENRY EASTMAN BENNETT. Ginn and Company, New York City, 1923. 296 pp.

Psychology for Students of Education. ARTHUR I. GATES. Macmillan Company, 1923. 489 pp.

Psychology in Theory and Application. HORATIO W. DRESSER. Thomas Y. Crowell Company, New York City. $3.50. 727 pp.

Rehumanizacion de la Cultura Cientifica par la Psicologia. HONORIO F. DELGADO. Lima, Peru. 79 pp.

Revista de Psiquiatra y Disciplinas Comexas. HERMILIO VALDIZAN AND HONORIO F. DELGADO. Vol. V, no. 1, 1924. Casilla 1589, Lima, Peru. 102 pp.

Special Disability in Algebra. PERCIVAL MALLON SYMONDS. Teachers College, Columbia University, New York City. 88 pp.

Syllabus for a First Course in Educational Psychology. F. B. KNIGHT AND G. M. RUCH. Iowa Supply Company, Iowa City, Iowa.

Study in Latin Prognosis. WILLIAM SIMS ALLEN. Teachers College, Columbia University, New York City. 40 pp.

Teachers' Difficulties in Arithmetic and Their Correctives. RUTH STREITZ. Price 30 cents. University of Illinois, Urbana. 34 pp.

Teaching of Latin in High Schools. H. J. BARTON AND OTHERS. University of Illinois, Urbana, Ill. Educational Research Bulletin No. 26. 25 pp.

Tijdschrift Van Den Nederlandschen Werkloosheids-Raad. ANTH. FOLMER AND J. GERRITSZ. Bureau: Kloveniersburgwal 70, Amsterdam. 88 pp.

Works of the Institute of Labor at Kharkoff. Kharkoff, Hospital Per. 203 pp.

Written Examinations and Suggestions for Their Improvement. WALTER S. MONROE AND LLOYD B. SOUDERS. Price 50 cents. University of Illinois, Urbana, Ill. 77 pp.

PUBLICATIONS ISSUED BY THE DEPARTMENT OF INTERIOR, BUREAU OF EDUCATION, WASHINGTON, D. C.

Art Education for Elementary Schools. JANE BETSY WELLING. Industrial Education Circular No. 21. October, 1923. 18 pp.

Consolidated Schools of Bernalillo County, New Mexico. A. MONTOYA. Rural School Leaflet No. 22. 8 pp.

Consolidation of Schools and Transportation of Pupils. J. F. ABEL. Bulletin No. 41, 1923. 135 pp.

Coöperative Education Association of Virginia. GEORGE W. GUY. Bulletin No. 53, 1923.

Child Health Program for Parent-Teacher Associations. LUCY WOOD COLLIER AND HARRIET WEDGWOOD. Health Education No. 5, 1924.

Educational Research. BIRD T. BALDWIN. Bulletin No. 42, 1923. 76 pp.

Educational Tests. STEPHEN S. COLVIN. Bulletin No. 57, 1923. 28 pp.

Free Textbooks for Public-School Pupils. WILLIAM R. HOOD. Bulletin No. 50, 1923. 14 pp.

Games and Other Devices for Improving Pupils' English. W. W. CHARTERS AND HARRY G. PAUL. Bulletin No. 43, 1923. 88 pp.

Health Promotion in a Continuation School. HARRIET WEDGWOOD. School Health Studies No. 5. 25 pp.

Municipal and School Playgrounds and Their Management. J. F. ROGERS. School Health Studies No. 6, January 1924. 22 pp.

Rhodes Scholarships. Higher Educational Circular No. 28, February 1924.

Schools and Classes for Feeble-minded and Subnormal Children, 1922. FRANK M. PHILLIPS. Bulletin No. 59, 1923.

Suggestions for a Physical Education Program for Small Secondary Schools. Physical Education Series No. 3, 1923. 79 pp.

Survey of the Schools of Alexandria, Va. Bulletin No. 56, 1923. 62 pp.